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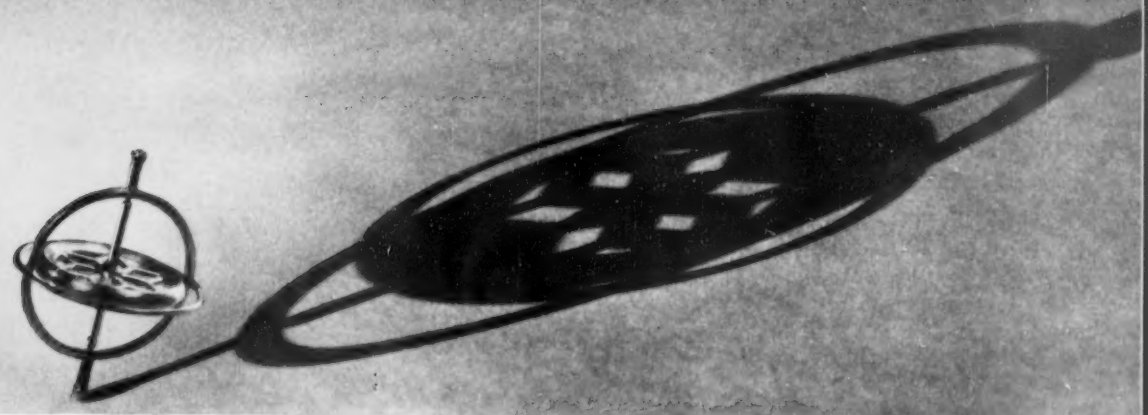

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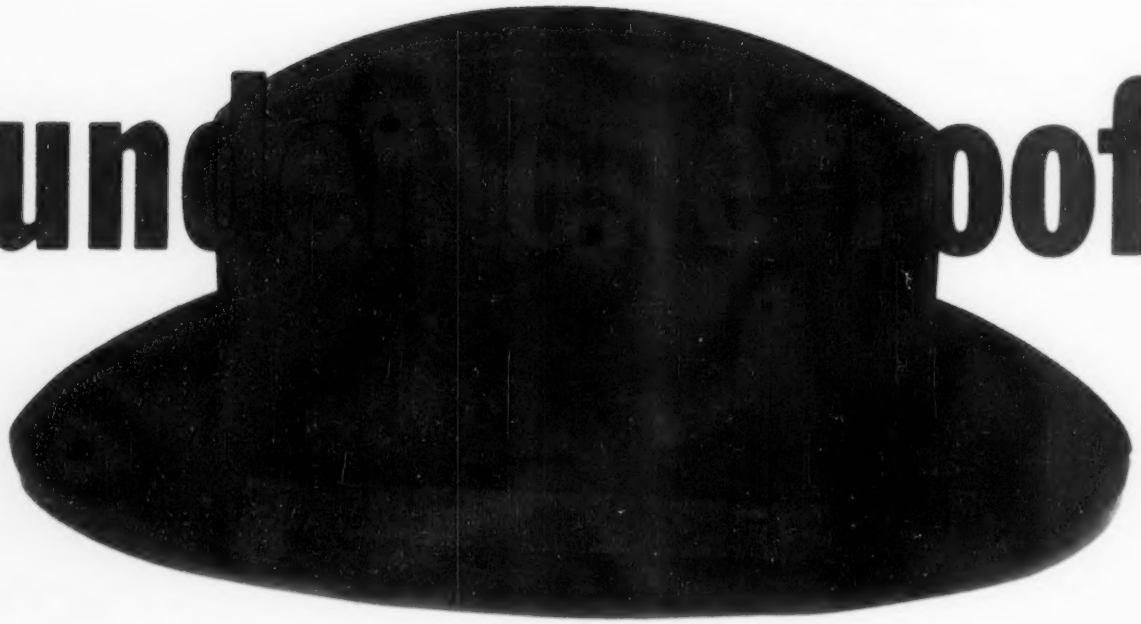

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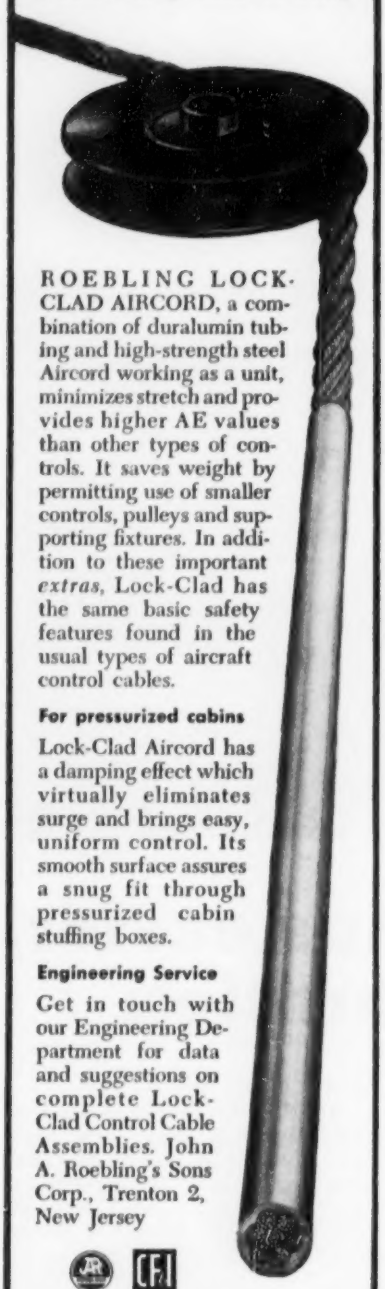

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Aviation Week

Volume 59 — September 21, 1953 — Number 12

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Table of Contents on Page 8

48,092 copies of this issue printed

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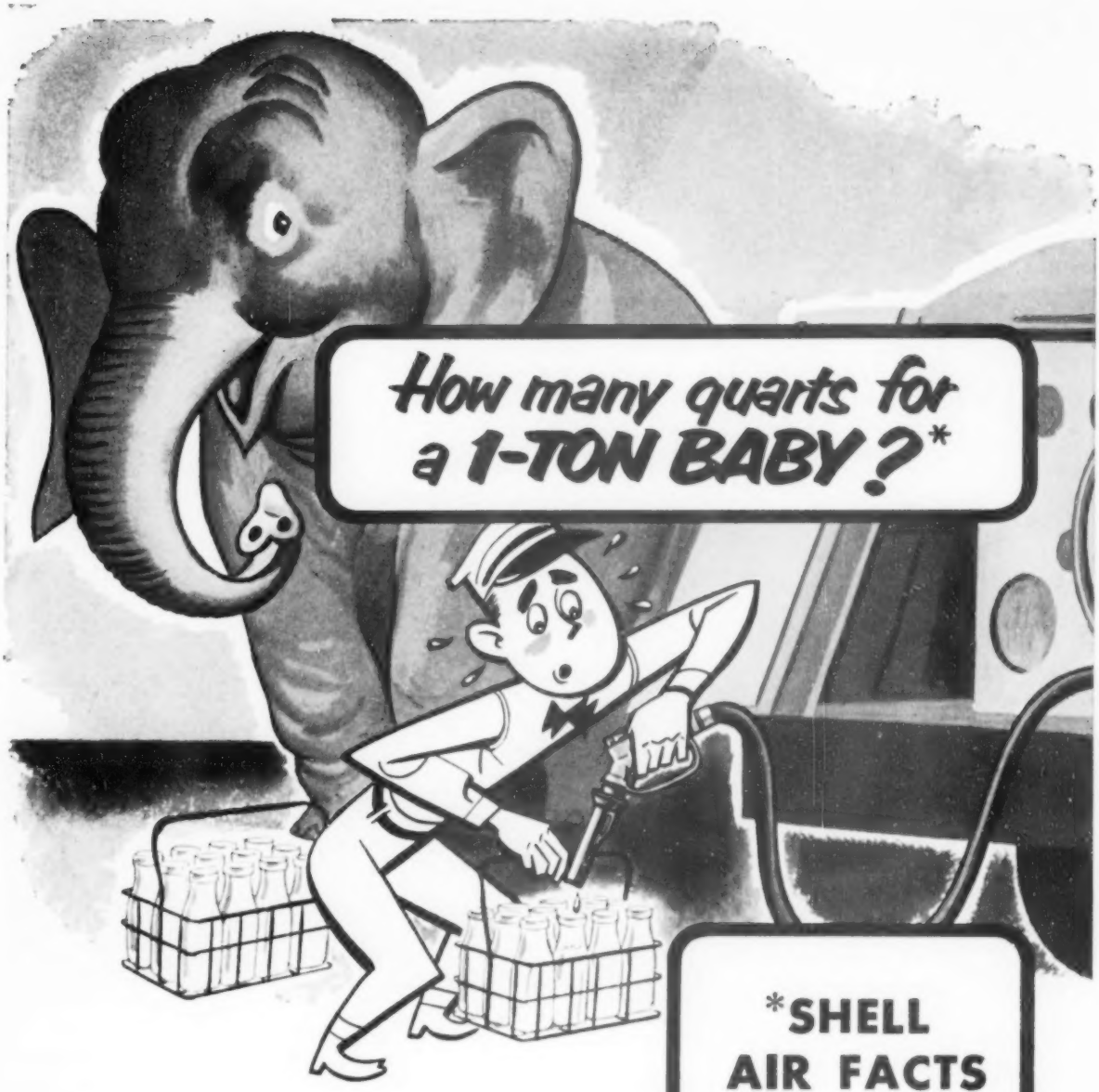

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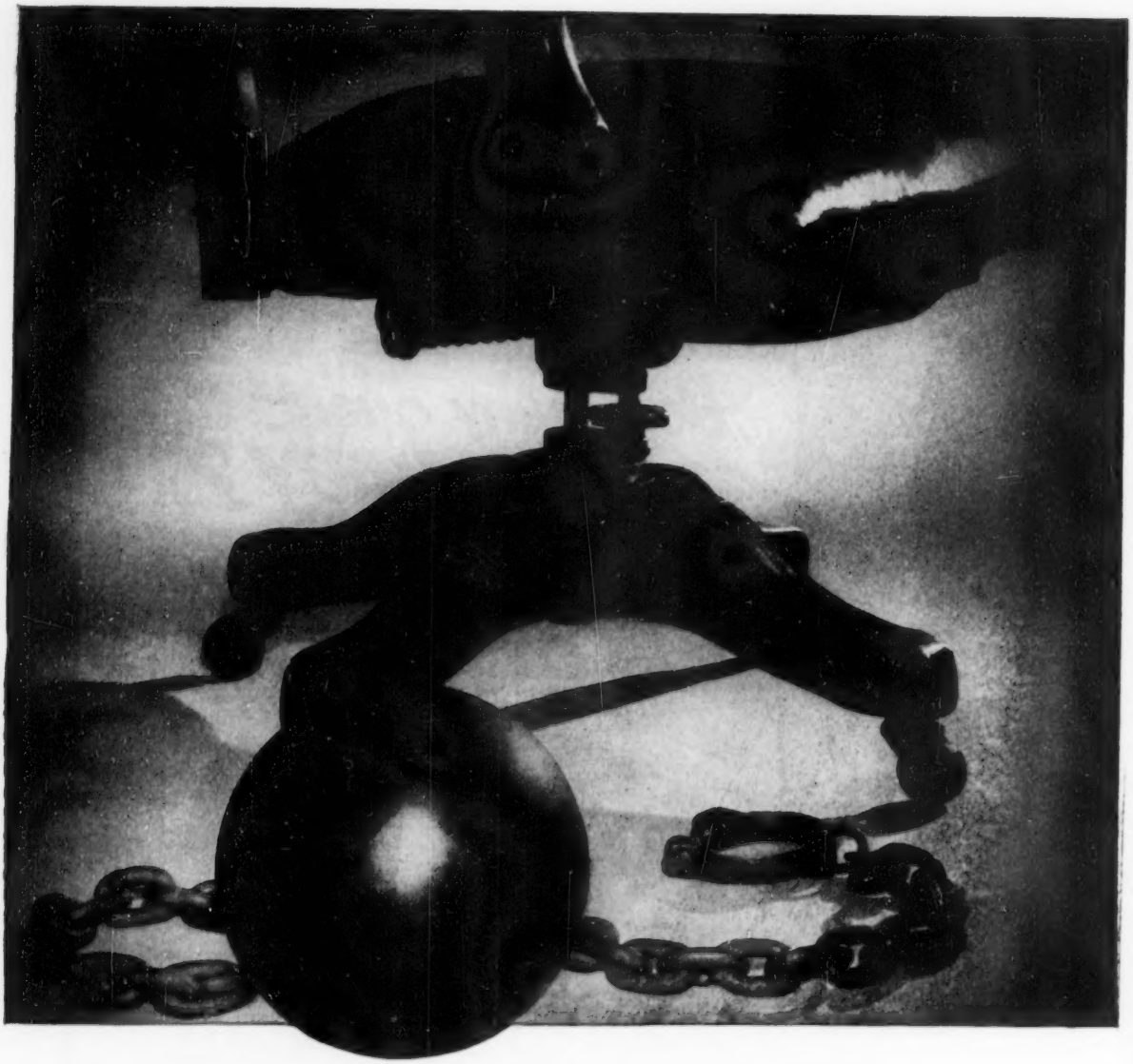

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NEWS DIGEST

Navy Plane Cuts

Navy has cut out 91 McDonell F3H Demon sweptwing fighters and the entire Douglas A2D Skyshark program in a reshuffle of its current procurement.

The transonic Demon is produced at McDonnell's St. Louis, Mo., plant. Temco Aircraft Corp., Dallas, is an important F3H subcontractor. The plane is powered by the Westinghouse J40, which Navy abandoned in favor of the Westinghouse J46 (AVIATION WEEK Sept. 14, p. 16).

Navy's move on the Skyshark was caused by unfavorable developments in the acceptance tests of the plane's Allison T40 turboprop engines which had been kept in the development stage unusually long. The Douglas AD Skyraider will be procured in place of the A2D.

No contractural revisions in fighter production are necessitated by the reshuffle, Navy emphasized, since the reduction is merely a stretchout pending sufficient availability of improved design engines.

LAST ASSIGNMENT for Alex McSurely (extreme right) was covering unveiling of Piasecki YH-16 helicopter. He is shown with top Piasecki officials.

Domestic

USAF cut its jet engine program last week to match earlier revisions of jet plane schedules (AVIATION WEEK Sept. 14, p. 18). The jet engine slash, involving mostly spare engines, runs into several thousand powerplants and involves several hundred million dollars. Hardest hit is General Electric on J47s for the B-47 and F-86F. Pratt & Whitney is not affected by the cuts. It appears likely that the Wright J65 also will be cut.

American Airlines Convair 240 crashed Sept. 16 approximately three miles from Albany (N. Y.) Airport during final approach, killing all 25 passengers and three crew members. Plane reportedly hit a radio tower.

Navy Bureau of Aeronautics has taken the wraps off a pilot plant factory which uses automatic machines to make avionic assemblies. Navy's automatic-factory techniques, the result of three years work by National Bureau of Standards, are expected to speed manufacture and cut cost of avionic equipment.

Jerome Lederer, managing director of Flight Safety Foundation, has received the Arthur Williams Award "for more than a quarter century of devoted service toward safety in the air." It is the first time this award has been given for achievement in aviation safety.

Alexander McSurely Dies in Ohio

Alexander McSurely, associate editor of AVIATION WEEK and one of its original staff members, died last week in Maderia, Ohio, at the home of his brother, James McSurely.

Alex was born in Hillsboro, Ohio. He built his reputation as an aviation writer and editor during 16 years of specializing on the subject after graduating from Miami (Ohio) University, the University of Missouri School of Journalism and serving as a general reporter on the Indianapolis News and Dayton Herald.

He began his aviation writing in Dayton, where he covered Air Force activities at Wright and Patterson Fields. During his Dayton days, Alex became a friend of the late Orville Wright and contributed much to the written record of the Wright brothers. He was recognized as an authority on the Wright era and had begun preparation of a book on the subject. While at Dayton, he also had a wide acquaintance among Air Force technical officers who today are among top USAF generals.

▶ **Midwest Editor**—After six years as aviation editor of the Dayton Herald, Alex joined the McGraw-Hill Publishing Co. as midwestern editor for Aviation News, Air Transport and Aviation magazines. Later he came to Washington as an associate editor for Aviation News where he specialized in covering the postwar boom in personal flying.

When AVIATION WEEK was organized in 1947 Alex was one of the original staff members as an associate editor and served in that capacity until his death. He was also recognized as an authority on helicopters, which he covered from the early flights of Igor Sikorsky in the VS-300 to the huge twin-engine Sikorsky S-56 helicopter assault transport. His last assignment was covering the unveiling in Philadelphia of the Piasecki YH-16, the largest helicopter yet built (see p. 16).

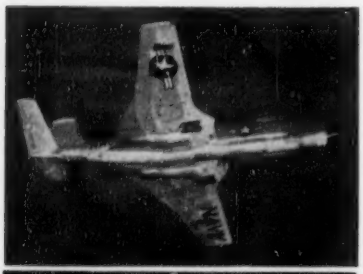
▶ **Safety Specialist**—Alex also did an outstanding job in following aviation safety developments and his stories in this field won him wide acclaim from airline pilots, airframe manufacturers and safety researchers. He won the TWA award for the best-informed aviation writing in small daily newspapers for 1943 and was second prize winner in 1942.

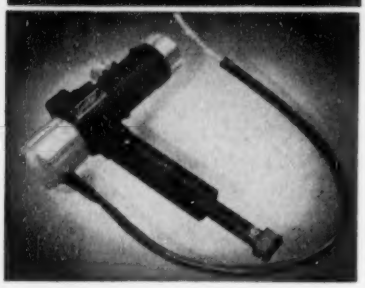
He was a member of the National Press Club, Aero Club of Washington Aviation Writers Assn., Sigma Delta Chi (National journalistic fraternity) and of Sigma Chi fraternity. In addition to his brother, he is survived by his wife, Gertrude; two daughters, Marian, a junior at Duke University, and Jane, a freshman at Miami University, and a son, Alan.

Mrs. McSurely asked that no flowers be sent.

ELEVATOR FEEL TRIM

Airborne Actuated on Navy's F2H-3





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The Aviation Week

September 21, 1953

Headline News

British Accent Production Need.. 12
Stroukoff Seeks C-123B Team-Mate.... 14
Fairchild Petrel Missile Hunts Subs.... 15
Piasecki Has Largest Transport Copter 16
AF Reverses on Recalling C-54s..... 18
CAB Hearing on Inflight Collision.... 18
Copter Shuttle Draws Crowds..... 21
Aircraft Backlog: $19 Billion..... 22
Boeing Airliner Joins Aviation Greats.. 25

•

Production Engineering

'Beast' Tests Connie Developments.... 29
Redux-Metalite Pays Off in F7U-3..... 38
New Foreign Planes..... 42
AF Tests Ejection at 500 Mph..... 37

•

Avionics

F-86D Uses 'Automatic Engineer'..... 48
New Potentiometers 50

•

Equipment

CPA's Varied Fleet Covers Canada.... 62
Newark Terminal Tries Innovations.... 70
GE Announces New Mass Flowmeter... 71

•

Air Transport

CAB Asks $80 Million '55 Subsidies.... 87
CAB Approves Cut-Rate Airmail..... 89
NAL President Receives $71,631..... 89
Newer Connies 92

•

Editorials

Airlines Look at the Helicopter.....102
Curtis W. McGraw.....102

•

Departments

News Digest 7
Picture Page 9
Who's Where 11
Industry Observer 11
What's New 26
Filter Center 56
New Aviation Products..... 75
Also on the Market..... 80
Off the Line..... 72
USAF Contracts 44
Fast Writeoffs 45
CAB Orders 88
Letters 100
Aviation Calendar 100

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9—Charles E. Brown; 12—(top) Damy; (center) Charles E. Brown; 13—(top) Charles E. Brown; (bottom) Eastern Publishers Service; 14—Butler Green; 15—Erwin J. Bulban; 37—USAF; 42—(top left) McGraw-Hill World News; (top right) Avro Canada; (bottom left) INP; 92—Erwin J. Bulban.

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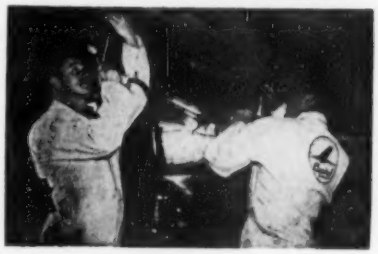

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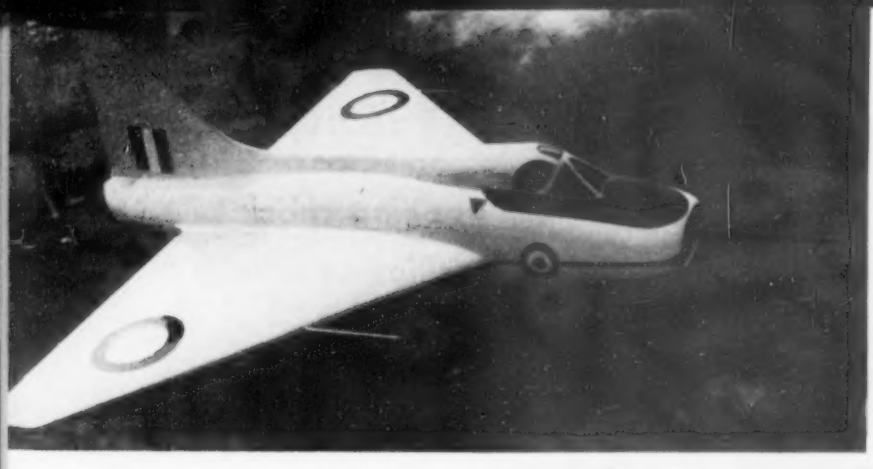
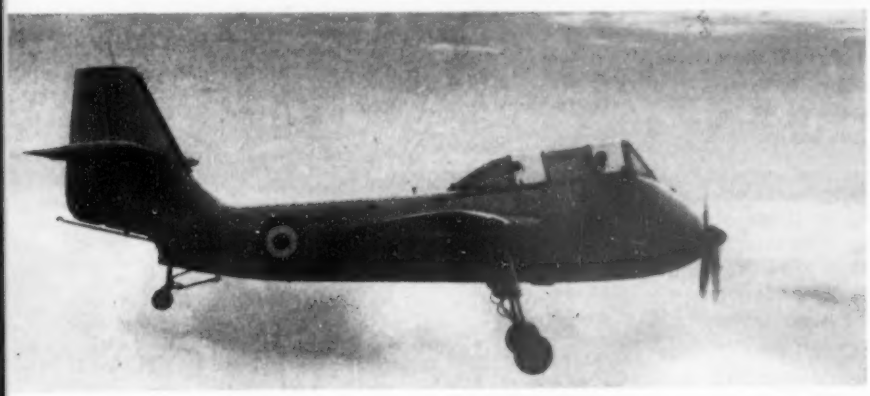


New Shapes In the Air at Farnborough SBAC Display

BOULTON PAUL P.111A—Delta-wing research plane (above) is seen in its brilliant yellow paint. This craft has been modified to incorporate four air brakes spaced around the fuselage just behind the cockpit. It also is fitted with a small parachute to slow its landing run. It is powered by a Rolls-Royce Nene turbojet. Dimensions: span 33 ft. 6 in., length 26 ft. 1 in., overall height 12 ft. 6 in. The P.111A is designed to explore delta-wing characteristics at high speeds.

SHORT S.B.5—Variable sweep research plane (right), now flying with wings swept approximately 60 deg. Position of the horizontal tail can also be varied; now mounted atop the vertical fin, it will be located below the fuselage after SBAC display. The S.B.5's landing gear is fixed, is relocated each time the sweep of the wing is varied. Wing sweep is manually adjustable on the ground only.



SHORT SEA MEW—New anti-submarine plane (left) is designed for economical and fast production. Powerplant is an Armstrong Siddeley Mamba turboprop. Landing gear is fixed. Construction is light to enable operations off small escort-type carriers. Note how pilot sits close to the nose, affording maximum visibility.

GLOSTER JAVELIN—Twin-jet all-weather delta-wing fighter (right) is seen with a new, more pointed nose. Powerplants are two Armstrong Siddeley Sapphires. Armament consists of four large cannon, two in each wing panel approximately midway to the wingtips. Incidence of the horizontal tail, mounted atop the fin, may be varied in flight.

- *less opening shock*
- *less oscillation*
- *less side drift*
- *jumper descends straight down* *landing on his feet*

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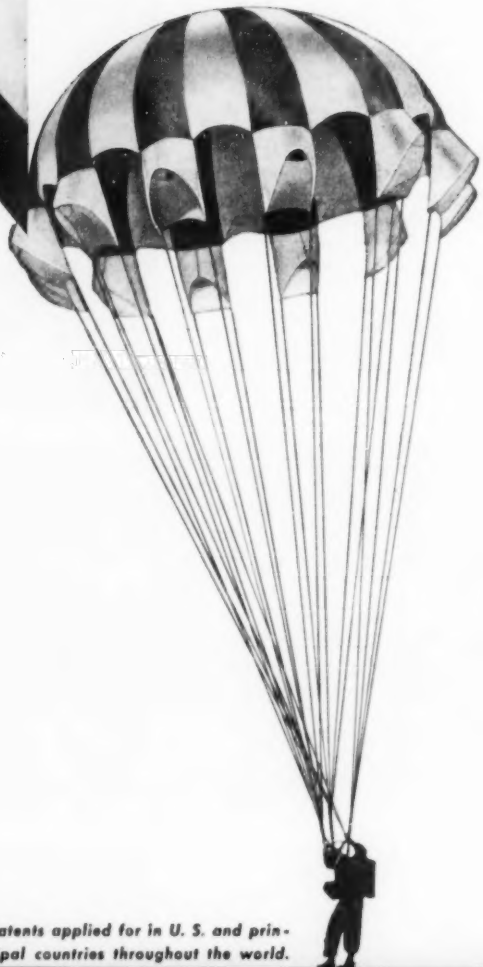

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WHO'S WHERE

In the Front Office

Vice Adm. John B. Moss (USN Ret.), former chief of Navy's Bureau of Aeronautics, has joined Bell Aircraft Co., Buffalo, N. Y., as a consultant.

Leon M. Wheatley is new vice president of R. M. Hollingshead Corp., Camden, N. J.

Changes

A. M. (Tex) Johnston has been appointed chief of flight test for Boeing Airplane Co., Seattle, succeeding **John B. Fornasero,** who had requested return to full-time piloting duties.

John P. Howe, former manager of General Electric Co.'s Knolls Atomic Power Laboratory, has joined North American Aviation, Los Angeles, as chief of the reactor materials section, atomic research department. **Robert L. Loftness** is new group leader of chemical development in the reactor section.

A. W. Morgan has become general manufacturing manager of Consolidated Vultee Aircraft Corp.'s San Diego Division. **W. L. Young** has been promoted to works manager of the division's Plant 1.

John W. Waddill has been named advertising director for Northwest Orient Airlines. Also appointed: **M. L. Putnam,** news bureau director, and **William J. Naylor,** assistant sales manager of the Continental Division.

Marvin J. Parks has been appointed customer relations manager of Air Associates' Aircraft Products Division, Teterboro, N. J. Other division changes: **Edmund B. Parke,** general manager; **Douglas A. Morrison,** sales manager; **Charles Gaver,** assistant sales manager; **Walter Stubbs,** engineering manager, and **Raymond Hart,** chief inspector.

Niels C. Beck has resigned as dean of Parks College of Aeronautical Technology, St. Louis, to join Armour Research Foundation, Illinois Institute of Technology, Chicago, as project development engineer.

R. L. O'Brien is new sales superintendent for Canadian Pacific Airlines.

John H. Pugh has been named director of advertising and public relations for the Axelson Division of Axelson Manufacturing Co., Los Angeles.

Howard L. Farrow has joined Arthur C. Withrow Co., Los Angeles, as plant manager.

Judson S. Sayre has become part-time merchandising consultant to Thompson Products, Inc., Cleveland.

Honors and Elections

Andrew B. Shea, president of Pan American-Grace Airways, has been awarded Peru's Order of Merit as a Grand Officer, the nation's highest civil decoration, for "distinguished service."

Edmund T. Price, president and general manager of Solar Aircraft Co., recently was cited for 25 years of service with the San Diego firm.

INDUSTRY OBSERVER

(Editor's note: The following Industry Observer column was cabled from London by David A. Anderton, AVIATION WEEK's Engineering Editor, who attended the SBAC show at Farnborough.)

►Union Aeromaritime de Transport's Comet 1A which crash-landed at Dakar in July is to be rebuilt. Insurance underwriters report the plane was a 70% insurance loss—that is, £350,000 was lost out of £500,000 coverage. De Havilland is rebuilding one wing of a BOAC Comet 1 that skidded off the runway at Calcutta's Dum Dum Airport in July. Wing and landing gear were wrecked. These two reconstruction projects mean that three—not five—Comets have been completely written off.

►British sources say that on at least two occasions all three engines on one side of a Boeing B-47 Stratojet have been lost by disintegration of a turbine or compressor. This, they say, partially nullifies the argument that podded engines eliminate damage to other engines if one fails.

►Loss of the de Havilland 110 prototype last year is believed to have been caused by aileron flutter at low speeds, say technicians; but some aerodynamicists express doubt that loss of lateral control would cause the plane to pitch up abruptly and apparently stop in the air, as motion pictures of the accident showed.

►Rolls-Royce R.A.14 is a single-spool turbojet like the rest of the Avon family. First run only 20 months ago, it now is being delivered in quantity. Engine has the highest thrust-per-unit area and thrust-to-weight ratio of current types, and has been up to altitudes of more than 60,000 ft. in its flying test bed. Westinghouse will get one or two engines in the near future as the first fruits of its agreement with Rolls.

►Rolls-Royce is pressing its case to get U. S. authorities to accept R.A.7 Avons for the F-86D Sabre night-fighters being assembled in Italy. First 50 of the order are to have GE engines, but eventually Italians are to produce their own. Money comes from off-shore procurement, to save disbanding the pool of skilled production labor in Italy.

►Westland has been doing development work with a four-blade metal rotor in a modified Sikorsky-designed S-51, powered by an Alvis Leonides engine. Object is to get higher speed out of the configuration.

►A long-life version of the Armstrong Siddeley expendable Viper turbojet is being developed. Designated the ASV.5, it will give 1,640 lb. thrust. Possible use for the engine: tip-mounted on helicopter rotors to supply propulsion.

►Martin Baker has developed a lightweight automatic ejection seat which with chute and safety harness weighs only 50 lb. Standard versions of the Martin Baker seat weigh 185 lb.

►Production versions of the Fairey Gannet, completely equipped and ready to operate from carriers, cost about $224,000. Only three of the three-man anti-submarine planes have been built. Most observers blame the delay on the Admiralty for changing the requirements in the middle of design, rather than Fairey.

►Approximately 30 British pilots have been checked out in delta-wing aircraft; there are currently about a dozen triangular craft flying. Avro's four small research deltas have been handed over to the Empire Test Pilots School at Farnborough.

►Washington belief that the Russians do not have an important axial-flow jet is causing Rolls-Royce some difficulties in selling its engines. Pentagon security officers have made it known that they do not like the idea of Comet 2s with R.A.9 axial jets going to such countries as Japan. So far no deals have been halted, but Rolls has to clear each step with Anglo-American security authorities.

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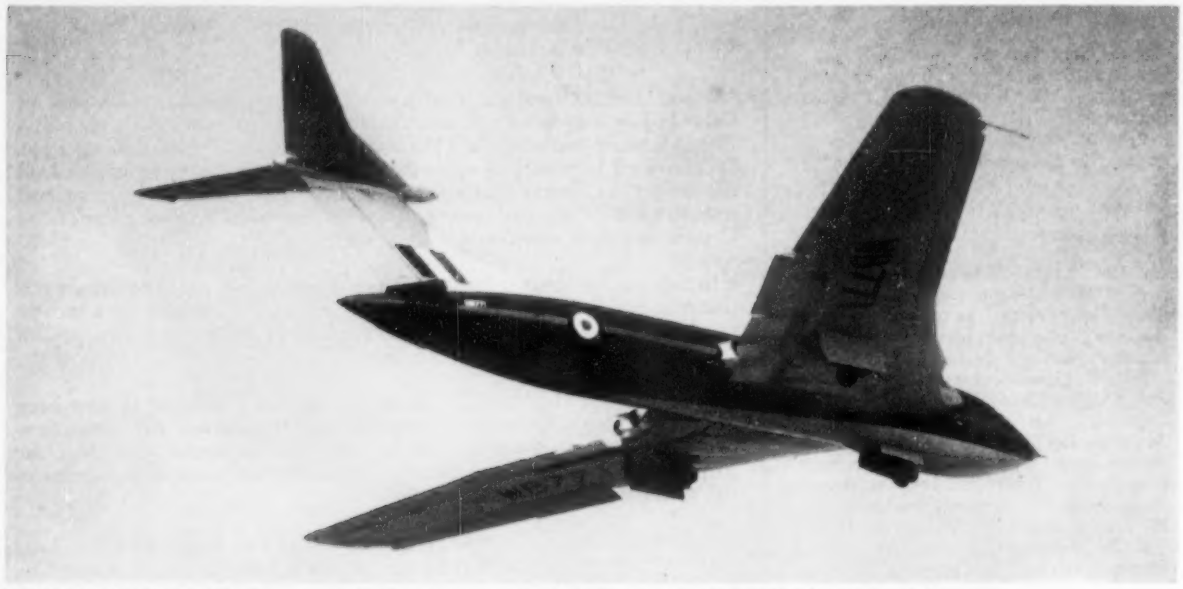
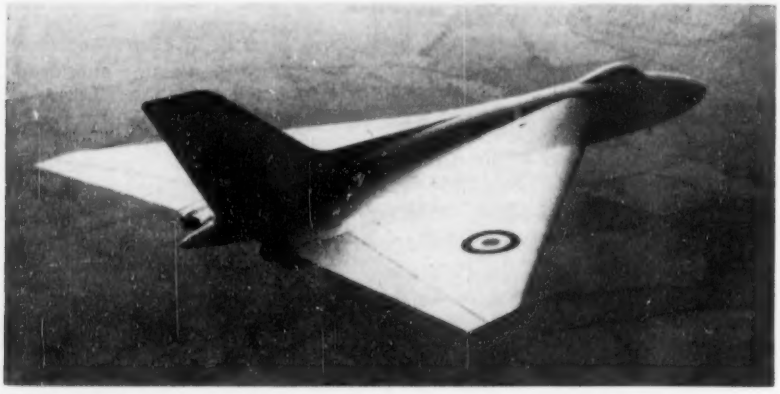


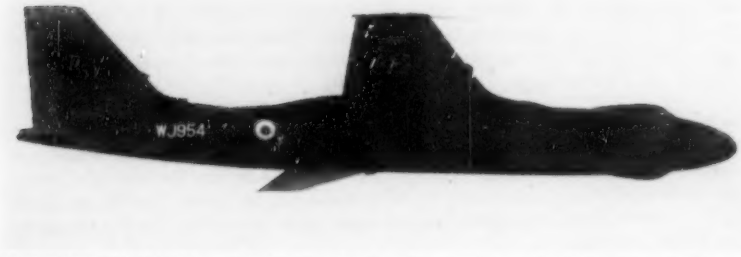
HANDLEY PAGE VICTOR crescent-wing bomber, one of RAF's three super-priority "V"-class types. Others are . . .

Behind the Glitter of SBAC

British Accent Need for More Production



AVRO VULCAN, two of which flew in this year's Farnborough display, and . . .



VICKERS VALIANT sweptwing four-jet bomber, with new landing gear nacelles.

- **Six deltas, two engines thrill show spectators.**
- **But planes must be built in quantity for air power.**

By David A. Anderton

Farnborough, England—Two engines and six delta-winged aircraft lifted this 1953 Society of British Aircraft Constructors display above the level of a generally disappointing experience.

• **The engines:** the twin Rolls-Royce R.A.14 turbojets, roaring out more than 10,000 lb. thrust each and rocketing an English Electric Canberra off the runway into a near vertical climb.

• **The deltas:** two prototype Avro Vulcans—one with Armstrong Siddeley Sapphires and the other with Bristol Olympus turbojets—escorted by three Avro 707 research types and one 707 prototype side-by-side delta trainer.

In an exhibit of the best flying discipline of the show, the six deltas flew a tight triangular formation as a finale to each day's performance.

In other respects, except for the news of Neville Duke's record-breaking

speed runs and seven days of excellent flying weather—neither of which had been planned by the SBAC—the show lacked the luster of earlier years.

▶ **Behind the Show**—But the real show wasn't at Farnborough. The SBAC display is merely the showcase for the industry, and like any other showcase it is a poor indication of the industry behind it.

The brilliant flying and the production prototypes have to be evaluated in the light of the effort being made to build British aircraft.

Until this year, that effort has been more well-meaning than fruitful. The British, who have made sly remarks about the French and their prototype air force, suddenly find themselves in the same position.

▶ **Serious Problem**—That is why the talk this year of production and the need for high output is on a more serious plane than ever before. Even the popular press, previously in the van with praise for the greatest air show in the world, has taken the realistic line that the show means nothing if there is no production to back it up.

If British planes can be built and sold, then Britons will have air power and exports. In effect, they will be able to have their cake and eat it too.

If they can't produce the Hunters and Swifts and Britannias that raced through the bright sky over Farnborough, they can't survive as an independent nation. It's as simple—and as tough—as that.

▶ **The Planes**—There were no new bombers, fighters or transports at Farnborough this year. Military leaders, inspecting nearly all of Western Europe's contribution to NATO, saw only one new military airplane, Short Bros. and Harland Sea Mew, an antisubmarine aircraft powered by an Armstrong Siddeley Mamba.

The Sea Mew is the first tangible result of the currently popular "stripped down" design philosophy. It has been ordered in some number for the fleet air arm with the hopes of selling also to the French and Dutch navies.

The Hawker Hunter and Vickers Swift—Britain's sonic sisters—made the fastest low-level runs of the show, but at a pace which everyone noticed was considerably slower than last year. Sonic booms were the order of each day, as these fighters climbed to 40,000 ft. to dive and aim the shock wave at the crowd.

But the brilliant flying performance of these two RAF stars did not mask the knowledge that there are only three Hunters flying and that only six Swifts are in service with the RAF.

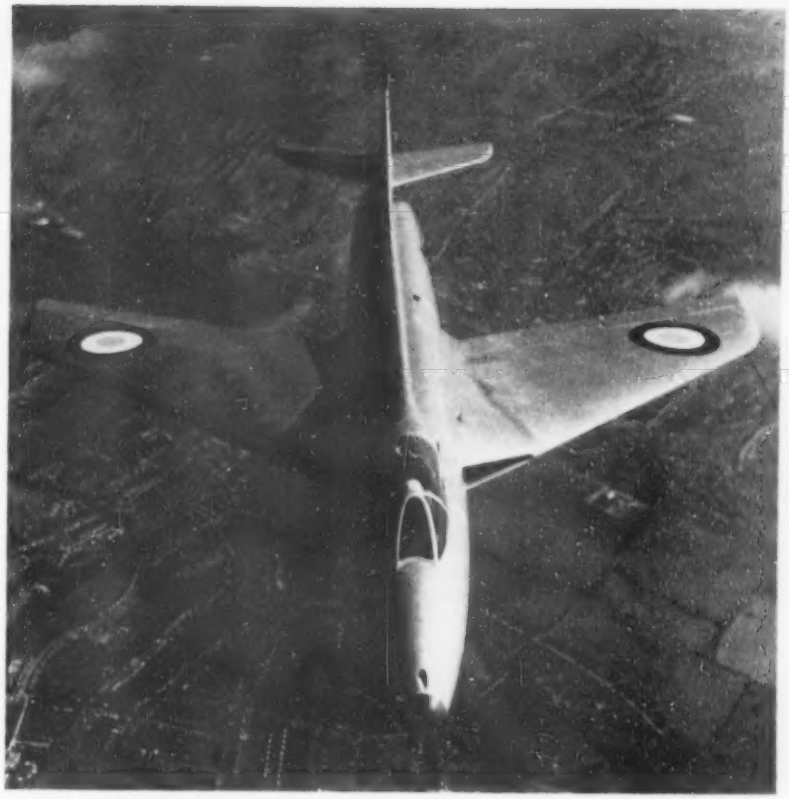
▶ **Bombers**—In bombers, USAF officers were impressed with the unusually steep approaches possible with the heavily flapped, crescent-winged Handley Page Victor, and the short takeoff runs for the Victor and the Avro Vulcans.

"Even empty, that's good performance," said one officer.

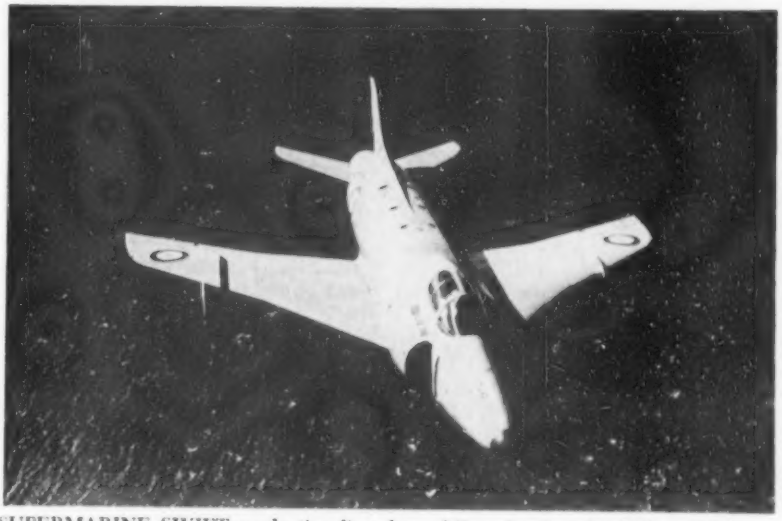
The Vickers Valiant B.2, powered by Rolls-Royce R.A. 14s and recognizable by a lengthened nose and long fairings trailing from the wing for a new landing gear, flew over the crowd from its base at Wisley. Not permitted to land at Farnborough because it lacked requisite flight time, the Valiant impressed observers with highspeed runs and rapid climbs; no assessment of takeoff or landing was possible.

▶ **Airliners**—Low point of the week-long exhibition was on Thursday, a day set aside for civil aircraft. All the military aircraft had been removed from the static park to the opposite side of the field, leaving only a tiny cluster of transport types huddled together.

It looked as pathetic as many indus-



HAWKER HUNTER is one of RAF's top new fighters, but only a few are flying.



SUPERMARINE SWIFT production lines have delivered only a handful to RAF.

BRISTOL 173 copter flew at Farnborough with its new front and rear stub wings.

try members felt it would be. Realistic Britons at working levels were unanimous in their comments that this was just not the year to set aside a civil day.

Airline officials who walked through the dozen or so planes on display saw all the familiar faces of Comet, Viscount, Heron and Britannia, now in the guise of production models available for export.

▶ **Chartered Viscount**—Vickers chartered a Viscount from Air France in order to be able to show; the company took the official line that the airlines want Viscounts so badly that they grab them off the assembly line.

Air France also was represented by a de Havilland Comet 1A, flown in for this display. The Comet 2 prototype was busy on flight test.

Bristol's Britannia prototype appeared this year with the scheduled production Proteus 705 turboprop engines and revised tailpipe exits. This 60- to 100-seater transport, generally regarded as the plane to beat on the North Atlantic and the real prospective money-maker for British Overseas Airways Corp., now is in full production at Bristol.

▶ **Bristol Copter**—The stub-winged Bristol 173 helicopter, tricked out in the colors of British European Airways, demonstrated single-engine takeoff and a straight and level speed run, in addition to the usual specialties of rotary-winged craft. Three have been ordered by BEA, mostly for trial runs. The 40-seat copter requested in a BEA design competition a year or so back still has to be ordered.

▶ **Pilot Complaints**—For safety reasons, strict rules were imposed on pilots at this year's exhibition. Turns made toward the crowd had to be at least three miles distant, the airspace over the crowd was completely banned, and a portion of the main runway was barred for use during either takeoff or landing.

The pilots didn't like this, and lost no time in protesting bitterly against the rules. Squadron Leader Bill Waterton, reprimanded for acrobatics over the spectators on dress rehearsal day, probably spoke for the group when he said: "I don't quite see how you can put on a show for spectators under present conditions."

In spite of their opposition, pilots kept within the safety limits during the rest of the week, although individual flight demonstrations did suffer.

▶ **Static Show**—Inside the big tent which housed the static displays of parts, accessories and models of project jets unborn, there were indications British design teams still have big ideas.

Among them were a Saunders-Roe 40-seat transport helicopter model, designed to the BEA requirement. Planned around a low wing to relieve most of the rotor loads in level flight, the Saro job is powered by a ducted fan.

▶ **Short Sherpa**—Short Bros. showed a model of the Sherpa high-altitude research plane (named after the native tribe which furnishes the guides for Mt. Everest climbs). It is a conversion of a glider, now powered with a pair of Turbomeca jets, and planned around the aero isoclinic wing (defined as a wing which deflects in bending without twisting under aerodynamic load). Wingtips are floating and can operate as elevators or ailerons.

Percival Aircraft showed a model of the P.87, a DC-3 replacement. Grossing 26,000 lb., the plane will seat 36 and carry them over a 300-mile stage length for about two cents per passenger-nautical-mile. Powerplants are a pair of pusher Napier engines, probably the turboprop Eland.

▶ **Missiles**—Missiles were almost nowhere in evidence. The Ministry of Supply showed a movie of flights of test vehicles launched with a single booster, and Fairey Aviation had a highly swept, T-tailed missile model which represented a project that never got off the drawing board. Armstrong Whitworth did show an early test vehicle with fixed wings and fins, of simple cone cylinder layout.

▶ **New Methods**—Aviation Traders (Engineering) Ltd., developers of a novel method of forming skins with double curvature and without a stretch press, showed how they intend to apply that method to the construction of another DC-3 replacement, the Accountant. With the technique—incidentally, the only new structures idea to Americans at the show—they believe that five men can build a DC-3-sized fuselage in two days.

The Handley Page stand showed a model of the H.P.97 trans-Atlantic airliner which absolutely no one takes seriously over here, and a model of the production version (20 on order) of the Victor. The Victor tail had been modified somewhat to reduce chances of flow breakaway at the intersection of horizontal and vertical surfaces, and the nose seemed to be a little longer.

De Havilland had a large model of the Comet 3 with drooped leading edge which increases the leading edge curvature somewhat and presumably improves the takeoff and landing lift-coefficients.

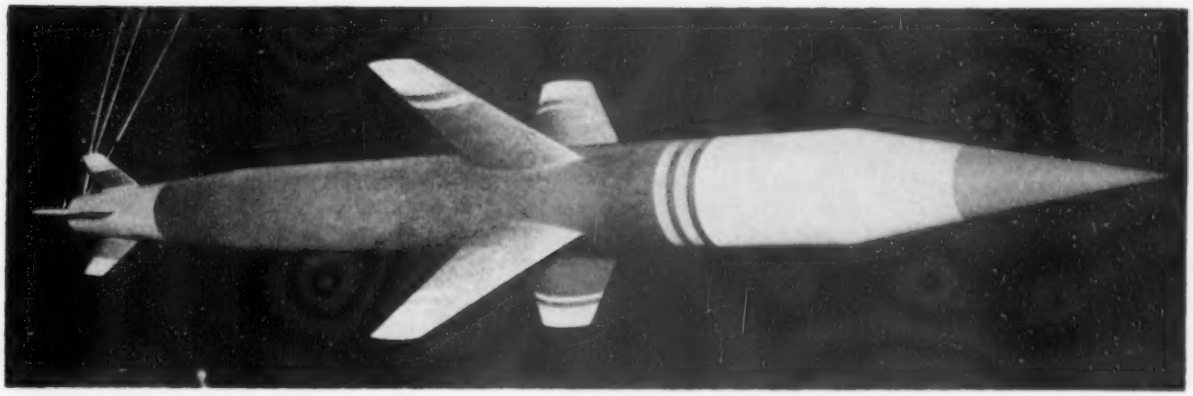
Stroukoff Seeking C-123B Team-Mate

Michael Stroukoff, head of the newly formed Stroukoff Aircraft Corp., indicated last week he would be willing to team up with the manufacturer who obtains the Air Force C-123B assault transport contract. Stroukoff formerly was chief engineer of Chase Aircraft Co., designers of the airplane.

Several of the firms invited to bid on the contract, as well as Fairchild Aircraft, which submitted a last-minute bid, have been wooing Stroukoff in order to obtain his counsel should they be successful in winning the contract. Rights to the aircraft now are owned by Kaiser Motor Co. subsidiary, Willys Motors, as a result of the Kaiser-Stroukoff split (AVIATION WEEK Sept. 7, p. 14).

Fairchild's conferences with Stroukoff in recent weeks stirred reports in the industry of a possible merger between the two firms. The reports were denied by both parties, but resulted in Fairchild submitting a bid to build the C-123B only hours before the Sept. 10 deadline at Air Materiel Command, Wright-Patterson AFB, Ohio.

AMC officials sent their recommendations to Roger Lewis, Assistant USAF Secretary for Materiel, last week. Final decision rests with Lewis' group. Observers were speculating on the possibility the Air Force might decide against building the transport. Size of the bids was expected to determine that.



FAIRCHILD displayed this recent configuration of its new turbojet-powered Petrel guided missile at the National Aircraft Show.

New Fairchild Petrel Missile Hunts Subs

By Erwin J. Bulban

Dayton—A new guided missile designed to hunt down and destroy enemy submarines lurking underwater from a distance of more than 20 miles is being developed by Fairchild's Guided Missiles Division, L. I., N. Y.

The new Fairchild sub-killing missile is named the Petrel. A recent version of Petrel (photo above) was suspended over the company's indoor exhibit booth during the recent National Aircraft Show near this city (AVIATION WEEK Sept. 14, p. 11). On view nearby was a cutaway full-size display model of the Petrel's powerplant, the Fairchild J44 monocoque turbojet, which has an announced thrust of approximately 1,000 lb. Industry observers speculated that Petrel jettisons the J44 just prior to diving into the water to hit the submarine.

Noticeably absent from the missile display was the full-size Chance Vought Regulus, which had been shown at the previous Detroit Air Show (AVIATION WEEK July 20, p. 18). Instead, a small bright-red model of Regulus was shown at the Chance Vought stand. It was designated XSSM-N-8.

▶ **Spy Scare**—Reportedly mingling with the throngs of Air Force and Navy personnel, foreign air attaches and spectators examining the displays were a pair of "iron curtain" agents. Federal Bureau of Investigation personnel cautioned representatives of several "critical" items to resist being pumped for information, some exhibitors told AVIATION WEEK.

▶ **Turbine Props Shown**—Examples of two large propellers slated for installation in new military turboprop transport planes were prominently displayed. Hamilton Standard exhibited a slowly rotating three-blade paddle prop of 15 ft. diameter slated for the new Lockheed R7V-2 Super Constellation which will have P&WA T34 engines.

Designated A3740, the propeller has two-foot-wide hollow-steel blades filled with Buna N and nylon combined with a foaming agent. Electric de-icing gear is fitted internally.

Curtiss-Wright showed samples of extruded blades similar to those that will be installed on the Douglas C-133, production version of the Douglas C-124B which will have P&WA T34 turboprop powerplants. Operating principles of the new C-W turbine propeller will be based on the props now used on the Convair B-36 with some modification. In place of the present hydraulic system, the new prop will utilize an electrically driven clutch arrangement, lessening maintenance problems and offer a considerable weight saving, according to a C-W official.

McCauley and Hartzell displayed cutaway full-size working models of their propellers for personal and executive aircraft. Hartzell reportedly is working on a new three-blade prop.

▶ **New Copter Engine**—A new piston engine for a still-classified large Navy helicopter was the top feature of Lycoming's display. Designated the R1820-84, it is rated at 1,525 hp. at takeoff and 1,275 cruise power. Its development, in conjunction with Wright Aeronautical Corp., was started by Lycoming last January. Production is scheduled for early 1954.

The engine was mounted on the stand at the 34-deg. angle at which it will fit into the new copter. Noteworthy was the use of aluminum sheet, rolled for stiffness and forced between the spaces between the lower cooling fins on each cylinder. This modification is designed to further increase cooling efficiency.

The new Lycoming also has rocker box drainage from all cylinders to permit pressure lubrication. A single dual magneto is fitted into the rear section in place of two separate mags, giving a cleaner accessory section.

▶ **Jet Engines**—The jet engine displays drew big crowds, particularly Pratt & Whitney's PT2F-1 turboprop, which the placard gave a rating of 5,600 eshp.

The Wright J65 was shown with nose and tailpipe blocked off to prevent examination of the interior. Westinghouse displayed cutaway versions of the J34 and its earlier J32 missile turbojets. Continental had a modified J69 Turbomeca Marbore on display.

▶ **Flight Refueling**—An eye-catching feature of the Flight Refueling Inc., stand was a model display of a Boeing KB-47 Stratojet refueling two swept-wing fighters from hoses trailing out of wingtip pods and simultaneously refueling a B-47 from a hose extending from the tanker's bomb-bay. The company is said to be working on a project for air refueling of Mach 1 fighters.

Top ARDC Officials Visit Avro-Canada

A group of 25 top USAF Air Research & Development Command officials are looking over secret projects at A. V. Roe-Canada, including a gyroscopic "flying saucer," AVIATION WEEK has been informed.

In the party are Lt. Gen. Donald L. Putt, ARDC commander; Maj. Gen. John McCormack, vice commander; Albert G. Hill, head of Lincoln Laboratory, and J. Marchetti, technical director of Cambridge Research Center. Among the Canadians accompanying the Americans are C. M. Drury, deputy Minister of National Defense, and Air Vice Marshal D. M. Smith, RCAF member for technical services. It is reported that the party plans to meet with the Defense Research Board in Ottawa.

PIASECKI YH-16 TRANSPORTER military copter can carry 40 troops. Civil, turbine-powered model will seat 48-72.

LOADING RAMP is under the YH-16 Transporter's tail. A 1,650-hp. P&WA R2180 engine is beneath each rotor.

Piasecki Unveils Giant Transport Copter

By Alexander McSurely

The Piasecki YH-16, the world's largest transport helicopter, rolled into public view for the first time last week at Philadelphia International Airport.

The U. S. Air Force unveiled the YH-16, named the Transporter. It can carry 40 troops, 32 litter patients, or three jeeps. Designed and built under the auspices of the Air Research & Development Command by Piasecki Helicopter Corp., it is America's first twin-engine tandem-rotor transport helicopter.

The YH-16 weighs more than twice as much as the largest helicopter in service today, Piasecki's 20-passenger H-21 Work Horse. Its fuselage is nearly 78 ft. long, about the size of a Convair-Liner. With the rotors at each end turning, the overall length of the helicopter is 134 ft. and the overall height is 25 ft.

►**Two Versions**—Piasecki spokesmen said a rigorous series of ground tests would precede the YH-16's first flight, scheduled in about six weeks.

The company is building two versions of the helicopter. The first is powered by two Pratt & Whitney R2180 reciprocating engines with take-off power ratings of 1,650 hp. each. The second version, designated the YH-16A, will have two Allison T38-type turboprops.

Cruising speed of the Transporter will be faster than that of any helicopter flying today, including the Piasecki H-21 Work Horse, which recently set a new official world speed record of 146.7 mph. Originally conceived as a long-range rescue helicopter, the YH-16A's enormous load-carrying capacity has led both Air Force and Army to expand their application of the helicopter to military logistics.

►**No Landing Strips**—Experience in Korea has demonstrated the need for helicopters as big as the YH-16. This aircraft can transport 40 fully equipped soldiers to the battlefront and land them without the need for landing strips and regardless of rough terrain or lack of roads.

For moving supplies, including guns and ammunition, it is not necessary to

YH-16'S SIZE can be compared with other Piasecki copters, YH-21 16-seater (hovering left) and HUP-2S (right).

TROOPS LOAD into tail end of new Piasecki YH-16 during recent demonstration at Philadelphia International Airport.

load the YH-16 internally. A sling underneath the fuselage can be used to carry equipment and the pilot can release his cargo from the cockpit while in flight.

The Piasecki Transporter is designed to carry a cargo pack fastened on the belly of the aircraft. The pack can be loaded and unloaded or moved about on the ground, independent of the helicopter, much like truck trailers. In this version, the capacity of the YH-16 is equal to that of a boxcar.

▶**Largest Rotors**—When equipped with a cargo pack, the YH-16 uses a tall landing gear that raises the fuselage about 10 ft. off the ground, permitting the pack to be fastened or removed with ease. The short and long-legged landing gears are interchangeable.

The YH-16's all-metal blades, 82 ft. in diameter, form the largest shaft driven rotors in the world.

There is a powerplant beneath each rotor in an engine room large enough to permit servicing of the power units in flight. The rotors are inter-connected by a driveshaft at all times. Power is applied by an engine at each end of this drive system. In the event one engine fails, the other unit is capable of driving both rotors and sustaining forward flight. In case of complete power failure, the YH-16 can be landed by autorotation on any space large enough to hold the aircraft.

The size of the rotor pylons allows internal access to the rotor controls in flight.

▶**Three-Man Cockpit**—The YH-16's gross weight is in excess of 15 tons. In the YH-16A version, because turbine engines are lighter than piston engines, the proportion of payload will exceed that of the YH-16.

The helicopter can be flown by one man. However, the cockpit has room for a co-pilot as well as a flight engineer or navigator.

In addition to the conventional door at the forward end of the cabin, the Transporter has a ramp at the rear that can be lowered for fast loading and unloading of jeeps, trucks, guns, cargo, personnel or litter patients.

Outside the forward cabin door, there is a cable hoist that can be operated by the pilot. This will permit loading or unloading at spots where the helicopter cannot land, facilitating rescue operations at sea or over rough terrain.

The YH-16 includes provisions for an automatic pilot capable of complete blind flight with fingertip control and maximum safety.

▶**Commercial Use**—In addition to providing a greater payload, advantages of the turbine version will be additional cabin space, shorter engine warmup

periods, less vibration and the added safety of carrying less volatile fuel because the turbines burn kerosene instead of gasoline.

For commercial application, the manufacturer is planning airline versions of the YH-16 Transporter. According to the type of service, it would be possible to seat from 48 to 72 persons. This version of the helicopter will fill the airline demand for a transport to provide short-haul intercity service between centers of cities.

An important advantage of the tandem design in helicopters is that it permits placement of the load anywhere in the cabin. This is a feature that speeds loading in military and commercial operations. The YH-16 Transporter has a larger center of gravity travel than any other aircraft, including the B-36.

► **Design Winner**—The YH-16 project was started by Piasecki following an Air Force design competition in which the company's tandem configuration was accepted as most promising to meet the requirements. The company has won two other major competitions with its tandem designs, resulting in production contracts for the Navy HUP, the H-25 Army Mule, and the H-21 Work Horse now being manufactured for the Air Force and Army

Piasecki officials said today that their plant area of more than 600,000 sq ft. was laid out in 1949 in anticipation of regular production of the YH-16, which is 31 ft. high on its tall landing gear. The plant's high bay area and overhead cranes provide ample facilities for production of this giant helicopter.

AF Reverses Stand On Recalling C-54s

Eleven airline operators breathed easier last week when Air Force revealed it had changed its mind about recalling 37 C-54 transports leased to domestic scheduled and nonscheduled airlines.

USAF reversed a decision made in June (AVIATION WEEK June 22, p. 15) to reassign the leased aircraft on a more efficient basis. At the time, 20 of the aircraft were being used on the Pacific airlift. With the Korean truce, requirements dropped. USAF now believes it desirable to leave the aircraft in the hands of present lessees as part of the U. S. reserve fleet.

► **Year Extension**—Negotiations will begin shortly between Air Force and the contracting airline operators to increase the monthly rental of the C-54s in order to bring rentals in line with prevailing commercial rates. Present leases which now expire Dec. 31, 1954, will be extended for a one-year period.

In addition to the increased rental, new contracts will provide for setting up a reserve fund which operators can use for maintenance and overhaul of the aircraft in their possession. Operators will contribute to the fund according to the number of aircraft they lease and the maintenance and overhaul requirements of aircraft they operate.

Thus Air Force insures proper maintenance and overhaul procedures of its aircraft. Should USAF call back the planes before new leases officially expire, Air Force would use the fund to do the work itself.

AF Orders F-104

USAF has given Lockheed Aircraft Corp. a contract to build prototypes of the new XF-104 air superiority fighter. Lockheed does not elaborate further on the airplane except to say it will be "a piloted jet airplane." The F-104 has been reported to be a lightweight interceptor (AVIATION WEEK July 20, p. 11).

► **C-46 Plans**—Individual conferences will be held shortly with each of the current lessees to renegotiate a more effective contract. Present contracts include a recapture clause agreement entitling USAF to call back its aircraft on 48-hour notice.

The move also changed USAF's plans for recalling the 90 C-46s leased to 31 other airlines, mostly nonskeds. When first hinted in June, Air Force action appeared to pose a major threat to many airline operators.

C-54s and C-46s first were leased to private operators shortly after World War II as a reserve potential for USAF, and as a fleet bolsterer for airlines.

Operators of the USAF C-54s and the number each fly are:

Pan American World Airways, 16; Trans World Airlines, 2; Northwest Airlines, 5; Great Lakes Airlines, 1; Viking, 1; Seaboard & Western Airlines, 1; Transocean Airlines, 1; Flying Tigers, 2; George Enloe, Burbank, Calif., 2; Francis E. Christmas, Anchorage, Alaska, 2; George W. Tompkins, Overseas National Airways, Inc., San Francisco, Calif., 4.

CAB Sets Hearing On Inflight Collision

Revised flight clearance and airways assignment procedures may come out of Civil Aeronautics Board accident hearings Sept. 24 on the non-fatal inflight collision 10,800 ft. over Michigan City, Ind., Aug. 26. Hearing will start at 9 A.M. at Del Prado Hotel, Chicago.

Evidence may reveal there is possibility of disaster under existing visual flights rule, a CAB spokesman said.

CAB officials stress the importance of the forthcoming testimony and further investigations it will generate. The planes came together, one under the other, in broad daylight on similar courses.

CAB Chairman Oswald Ryan will preside over a CAB panel including Safety Investigation Bureau Director William Andrews, chief investigator James Peyton, hearing examiner Everett Bosworth and CAB Chicago region chief Fred Powell. Also attending will be experts from virtually all segments of the operating end of the civil aviation industry, including airline and private pilots, CAA, and airline management.

New GE Rocket Motor

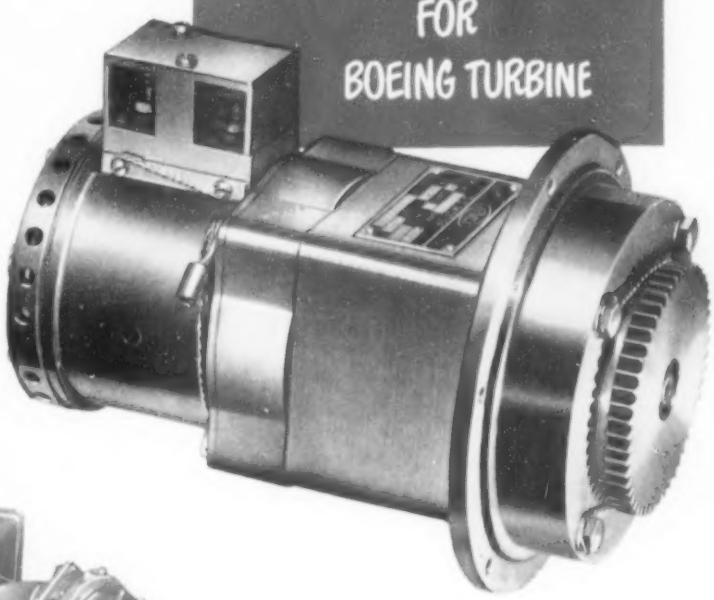
General Electric Co. has developed a rocket motor producing in excess of 20,000 lb. thrust. Motor is made of non-critical materials, can be economically mass-produced and uses readily available propellants, says a GE spokesman.

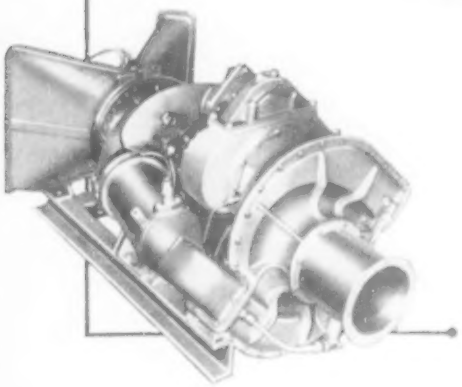
AERO COMMANDER IN ARMY UNIFORM

Here is one of three YL-26 Aero Commander light transports delivered to the U. S. Army by Aero Design & Engineering Corp., Bethany, Okla. Powered by two 260-hp. Lycomings, the YL-26 can seat up to six. Top speed is approximately 210 mph.

EEMCo technical bulletin

LIGHTWEIGHT COMPACT STARTER-GENERATOR FOR BOEING TURBINE





The starter-generator used on the Boeing 502 Turbine is another example of EEMCO ability to design and produce motors to solve special problems.

This 15¾ pound unit brings the turbine up to 6000 RPM for firing and is able to support the starting effort after firing, up to 10,000 turbine RPM. When the turbine is operating, it acts as a generator without mechanical change-over or gear box and is capable of delivering 30 amps continuously.

Compactness and light weight result from the direct mating of the starter-generator with engine gear train, making it an integral part of the turbine.

High temperatures are involved since the installation is in close proximity with the combustion chamber.

This EEMCO starter-generator is ideal for use on all types of small turbines wherever a combination of starting and generating is required.

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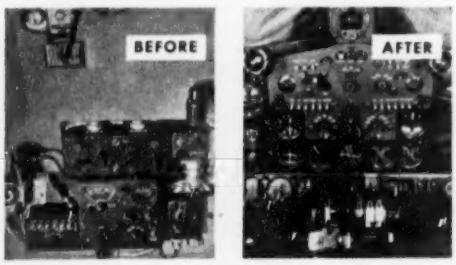
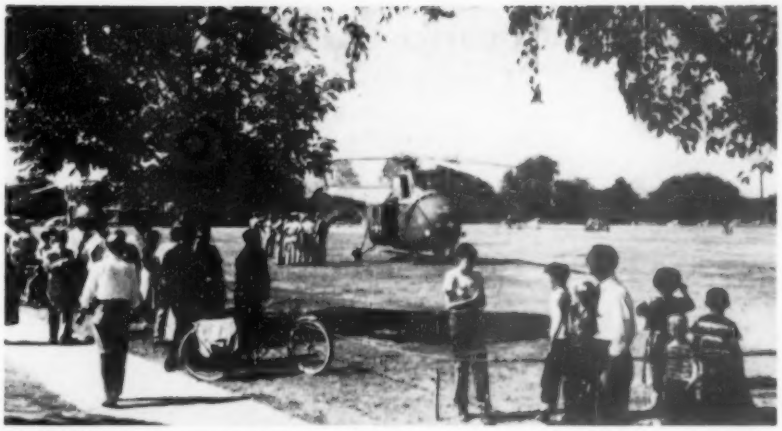


ORDINARY INSTALLATION VERSUS RAS INSTALLATION... On the left is an ordinary installation of a $29,000 "nerve and control center." On right, same equipment "custom engineered" by RAS specialists. RAS complete facilities include main hangar handling twenty-five planes "in work" at one time, complete radio and electronics service center, most modern equipment for engine and accessories overhaul.



SIKORSKY H-19s attract attention at temporary heliport set up in downtown Dayton.

Copter Shuttle Draws Crowds

An old stone Union soldier at the top of a monument in Dayton's Riverview Park got a thorough dusting off during the Labor Day weekend—from the rotor downwash of Sikorsky and Bell helicopters that shuttled 605 persons between the park and the National Aircraft Show.

The show was at Cox Municipal Airport, 10.8 mi. from downtown Dayton by an express highway. But the highway was jammed with thousands of aircraft showgoers. Those who started early enough could make it in about 45 min. Sometimes it took an hour or more—except by helicopter.

▶ **Copter Busses**—For military personnel and newsmen who received special helicopter passes, the trip was 9 to 11 min. after takeoff. It was worth waiting to get on the next shuttle if the first one was filled, because the Army dispatcher was using as many as 11 of the big H-19 copters during the peak hours, seldom fewer than five.

In addition, there were several of the small Army Bell H-13s and one of the most active shuttlers was a white Bell Model 47G demonstrator "Snowwhite" piloted by Joe Mashman, Bell engineering sales representative.

Army Sikorskys carried five passengers, with full fuel load, taking a bigger safety factor than is often used for military missions. There wasn't anything in the shuttle resembling what safety experts call an "incident," much less an accident.

▶ **Temporary Heliport**—The operational base, just over the Miami River from the downtown Dayton area, was about 200 ft. square. Sometimes there were as many as four copters in at one time, and it seemed a little crowded.

Many Daytonians found the temporary heliport a better show than the National Aircraft Show. Crowds of several hundred to a thousand lined the ropes which separated the landing area from the rest of the park to watch arrivals and departures.

▶ **Rooftop Climax**—Mashman, considered one of U. S.'s best copter pilots, had the advantage of his new power boost control in the Model 47G, climaxed the three days of ferrying by making several landings to take passengers from the roof of the 14-story Dayton Biltmore Hotel.

He landed on a flat-top penthouse roof about 50 ft. square and told AVIATION WEEK he had plenty of room to spare.

The penthouse was Dayton's first heliport, and its first rooftop helicopter landing. And it was probably one of the highest rooftop landings yet performed anywhere.

Air Operations Bureau Gets New Director

Joseph H. Fitzgerald, formally has received the nod from Chairman Oswald Ryan to become director of Civil Aeronautics Board's Bureau of Air Operations.

Fitzgerald fills the vacancy created by the recent resignation of Gordon Bain. A lawyer and economist, he has been director of the Board's Alaska office since Sept. 9, 1951. Prior to that he was regional attorney for Civil Aeronautics Administration at Anchorage, Alaska.

He is a native of Missoula, Mont., and is a graduate of the University of Montana. From 1932 to 1935 he attended Oxford University in England as a Rhodes scholar where he received two degrees in law.

As soon as he can wind up personal affairs in Alaska, the new Air Operations Bureau director will move his family to Washington and assume his new duties.

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Second Quarter Backlog Figures

(All figures in millions of dollars)

Product	Backlog Mar. 31, 1953	Net new orders during Quarter	Net sales during Quarter	Backlog June 30, 1953
Complete aircraft and parts	$11,994	$1,807	$1,403	$12,398
For U. S. military customers	11,173	1,743	1,279	11,637
Other	821	64	124	761
Aircraft engines and parts	5,314	567	578	5,303
For U. S. military customers	5,138	538	532	5,144
Other	176	29	46	159
Aircraft propellers and parts	305	49	49	305
For U. S. military customers	276	44	42	278
Other	29	5	7	27
Other products and services	889	235	190	934
Total	$18,502	$2,658	$2,220	$18,940

Aircraft Backlog: $19 Billion

Backlog of aircraft industry orders at the end of the second quarter of the year, June 30, made another small jump over figures at the end of the first quarter, Mar. 31, to $18,940 million.

A report covering 50 manufacturers, prepared by Civil Aeronautics Administration and the Census Bureau, reveals the second quarter backlog was 2% higher than the $18,502-million backlog at the end of Mar. 31. Compared to the second quarter of 1952, this year's total backlog was 32% higher.

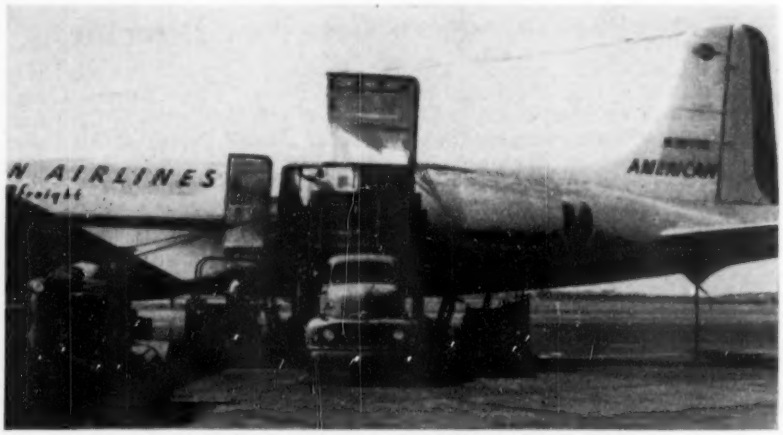
Major increase was noted in the backlog of complete aircraft and parts. Comprising 65% of the quarter-end backlog, it was 3% higher than the previous quarter. Orders for aircraft engines and parts accounted for 28% of the total backlog and were about the same as orders on hand at the end of the first quarter of this year.

The same thing was true of orders for propellers and parts which made up 2% of the total backlog.

In each of the three categories, backlogged orders were more than 90% military: aircraft 94%, aircraft engines 97% and propeller 91%.

Net new orders received during the quarter amounted to $2,658 million. They represented 14% of the total backlog, while the value of sales made during the quarter was 12% of the outstanding backlog.

New orders for complete aircraft and parts were 29% greater than sales. The value of new orders for aircraft propellers and parts was the same as sales, while new orders for aircraft engines and parts were 2% less than sales.



AA'S NEW DC-6AS HANDLE BIG JOB

American Airlines employes are seen handling a tricky cargo job; unloading an 8,500-lb. generator from the spacious freight cabin of one of the carrier's recently delivered windowless DC-6A freighters. Three of the large generators were flown in two AA DC-6As from San Francisco to New York for the Army Engineers. Ordinary handling equipment was used; three forklifts, a high-lift truck and block-and-tackle.

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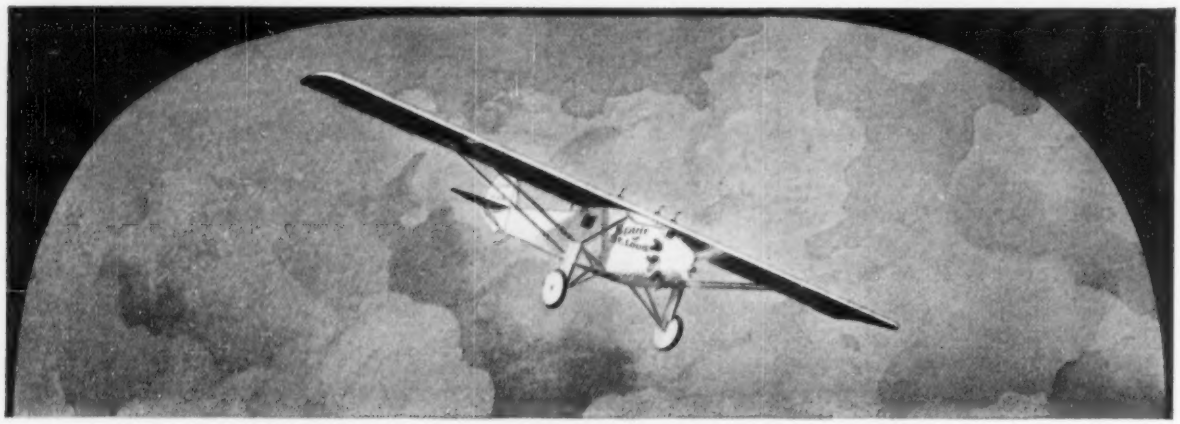

From the Spirit of St. Louis to the Super Constellation

At about the half-way mark in the history of aviation, the whole world was electrified by Lindbergh's daring flight across the Atlantic. Together with a profound admiration for this unparalleled accomplishment, people everywhere began to realize that aviation had truly come of age.

To us in the aviation industry, this spectacular achievement served as a dramatic highlight to the story of aviation's constant progress . . . a story of unremitting research, improved design and sheer courage that began a quarter of a century before this historic flight.

This Division of Bendix is proud, indeed, that Scintilla Magnetos sparked the engine of the Spirit of St. Louis. It is doubly proud that on practically every other outstanding flight, its products have played an important part and that on today's outstanding airplanes such as the new Super Constellation, Bendix Ignition is again helping to set new standards of performance.

Yes, from Lindbergh to Lockheed, the industry has come to know Bendix* as the Most Trusted Name in Ignition.

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Fast Flier

Edwards, Calif.—Marine Lt. Col. Marion E. Carl became the world's fastest military flier Sept. 2 when he reached a speed of 1,143 mph. in the Douglas Skyrocket, but failed to better Bill Bridgeman's unofficial world speed record of 1,238 mph. in the same aircraft.

It was the second assault on Bridgeman's mark by the Marine ace. He fell short in an attempt Aug. 31.

In his series of five flights in the Skyrocket, Carl did set a new altitude record of 83,235 ft. (AVIATION WEEK Sept. 7, p. 17).

Carl's Sept. 2 speed run which reached Mach 1.7 was made at an altitude of 68,000 ft. A B-29 mother ship carried the Skyrocket aloft as usual.

Early Boeing Airliner Joins Aviation Greats

"Adaptable Annie," one of the 74 Boeing 247 transport series, has joined the ranks of aviation greats in the National Air Museum.

The early Boeing transport "earned her place in green pastures," says Civil Aeronautics Administrator Fred B. Lee, who attended a retirement banquet for the plane. Other speakers to eulogize "Annie": Paul Garber, curator of the air museum; Sen. Homer Capehart; Donald Stuart, CAA; Jennings Randolph, Capital Airlines, and Roscoe Turner, who formerly flew the plane.

▶**Annie Firsts**—The 247 series, built during 1932-1935, established a number of firsts in commercial transport service:

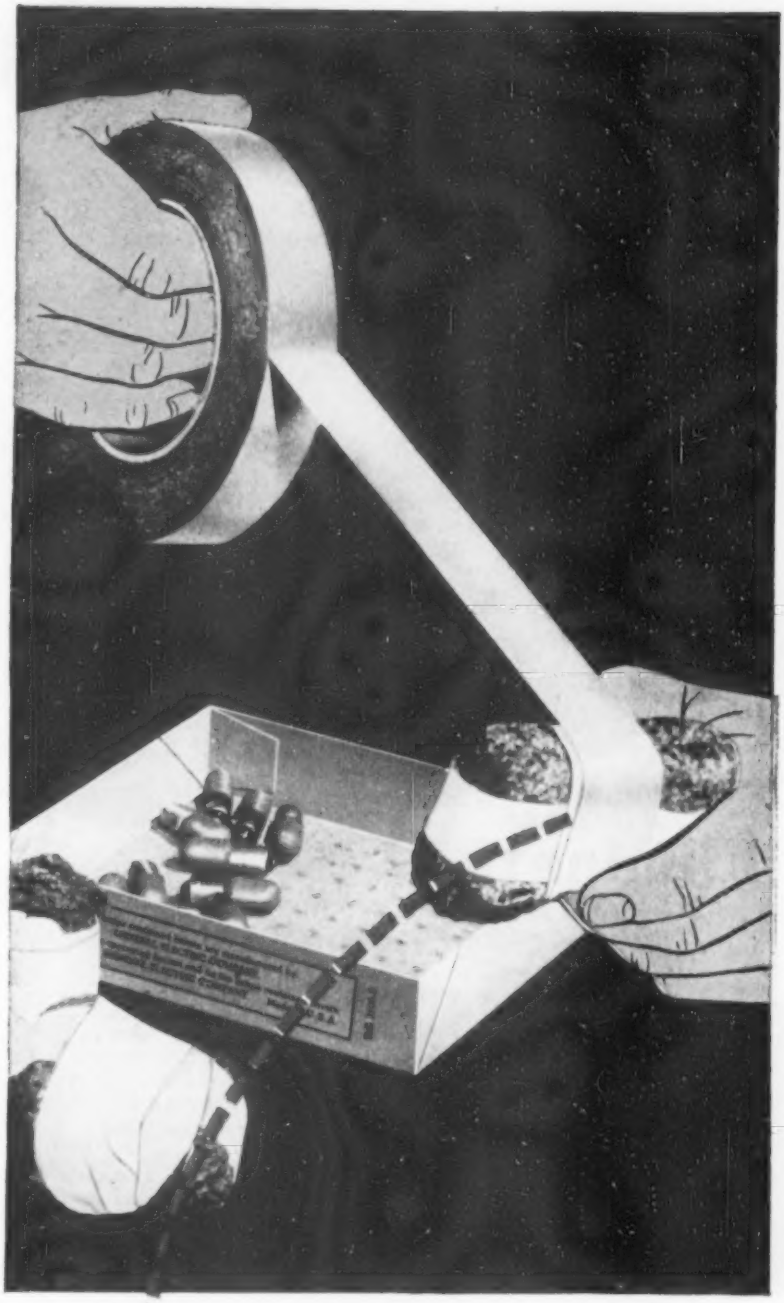
- **Supercharged engines.**
- **Retractable landing gear.**
- **Control-surface trim tabs.**
- **Automatic pilot.**
- **De-icing equipment.**

The 247 also was the first twin-engine transport monoplane to climb on one engine with a full load.

It was in 1934 with Turner that Annie first gained recognition. Then, along with Clyde Pangborn and Reeder Nichols, she completed the London-to-Melbourne race in 91 hr. to gain third place.

▶**Full Life**—Two years of service with United Air Lines followed, after which Annie became an executive plane for Union Electric Co. In 1939, she was drafted into government service, first with the Air Safety Board, then with Civil Aeronautics Administration.

At CAA Annie gave her all for science. Engineers ripped her wings to ascertain better lighting positions. They weighed her down with pounds of saw-



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dust to test stall warners under simulated icing conditions. She underwent several other scientific operations prior to retirement.

Iraqi Airways Buys Three Viscounts

Firm orders for the Vickers Viscount have climbed to 84 with purchase of three of the turboprop transports by Iraqi Airways.

The contract terms were negotiated through Iraqi's technical adviser, British Overseas Airways.

▶ **Eight Customers**—Vickers says that negotiations "with many other airlines are in progress" for Viscounts. Its listing of firm orders now includes these eight carriers:

- British European Airways, 38.
- Air France, 12.
- Aer Lingus, 4.
- Trans-Canada Air Lines, 15.
- Trans-Australia Airlines, 6.
- British West Indian Airways, 3.
- Hunting Air Transport, 3.
- Iraqi Airways, 3.

BEA has had the turboprops in service since April and recently reported that it made a profit of approximately $126,000 on the first 1,000 hr. of Viscount operation.

WHAT'S NEW

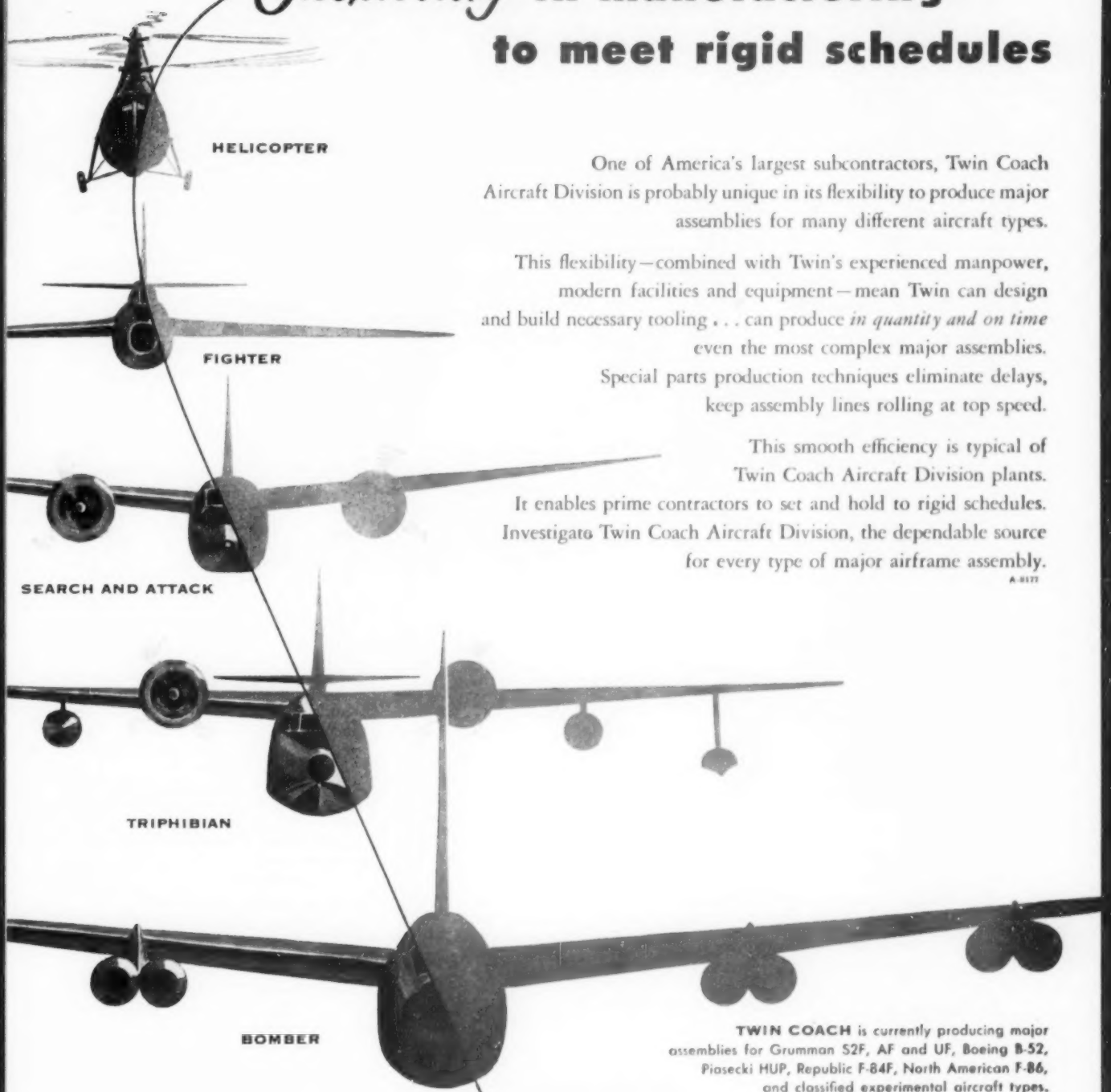
Telling the Market

Engineering bulletins describing **Kelon-F** (Fluorothene) and **Kelon-T** (Teflon) properties, facilities for manufacture, and products are available from W. S. Shamban & Co., 11617 W. Jefferson Blvd., Culver City, Calif. . . . Comprehensive roundup of **handling equipment,** such as fork lifts, pallet trucks, portable cranes and elevators and hand trucks, is given in 100-page illustrated pocket catalog, 11th edition, issued by Barrett-Cravens Co., 4609 S. Western Blvd., Chicago 9.

Profile milling machine, Model A-72, with highspeed spindle and feed for non-ferrous metal milling is described in illustrated 16-page bulletin (No. 1140), complete with full details of design, construction and machine movement. Write Onsrud Machine Works, Inc., 3900 Palmer St., Chicago 47. . . . Specifications and description of **16-in. swing turret lathe** with 1⅛-in. spindle bore and 1-in. collet capacity suitable for high-precision duplicating are given in Catalog No. 5312 released by South Bend Lathe, South Bend 22, Ind.

Technical catalog describing Hi Flow line of **quick-disconnect couplers** de-

Flexibility in manufacturing to meet rigid schedules



One of America's largest subcontractors, Twin Coach Aircraft Division is probably unique in its flexibility to produce major assemblies for many different aircraft types.

This flexibility—combined with Twin's experienced manpower, modern facilities and equipment—mean Twin can design and build necessary tooling . . . can produce *in quantity and on time* even the most complex major assemblies. Special parts production techniques eliminate delays, keep assembly lines rolling at top speed.

This smooth efficiency is typical of Twin Coach Aircraft Division plants. It enables prime contractors to set and hold to rigid schedules. Investigate Twin Coach Aircraft Division, the dependable source for every type of major airframe assembly.

A-5177

TWIN COACH is currently producing major assemblies for Grumman S2F, AF and UF, Boeing B-52, Piasecki HUP, Republic F-84F, North American F-86, and classified experimental aircraft types.

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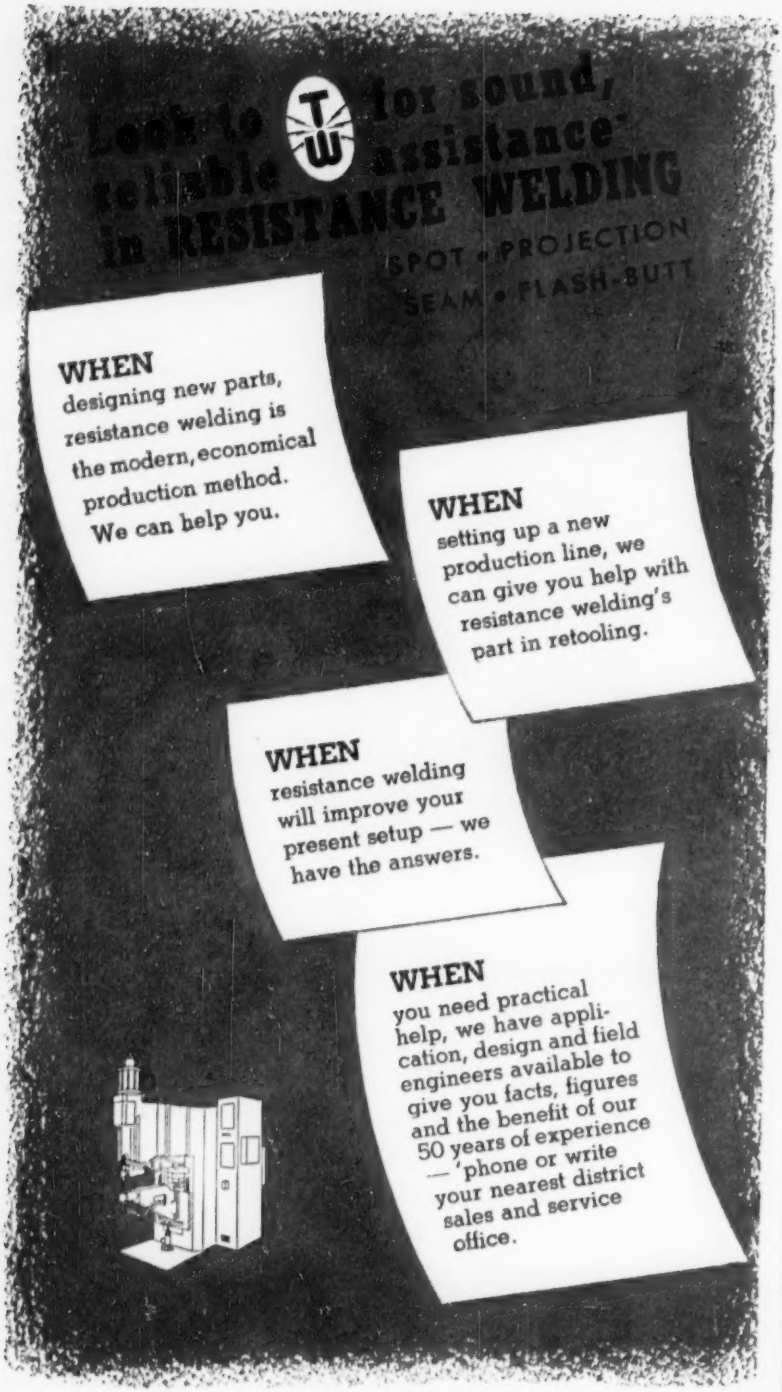
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Picture story of the Work-O-Matic **materials handling system** in operation is found in two-color booklet put out by Union Metal Mfg. Co., Canton, O. . . . Product Bulletins Nos. 532 and 533 with technical and performance data on Type 915 **vibration isolator** and Type 150-400 VD **medium impact shock machine** have been released by Barry Corp., 815 Pleasant St., Watertown 72, Mass. . . . Four-way Electro Valve for **remote control of air-operated devices** is described in Bulletin No. 311-10 put out by Sciaky Bros., Inc., 4915 67th St., Chicago 38.

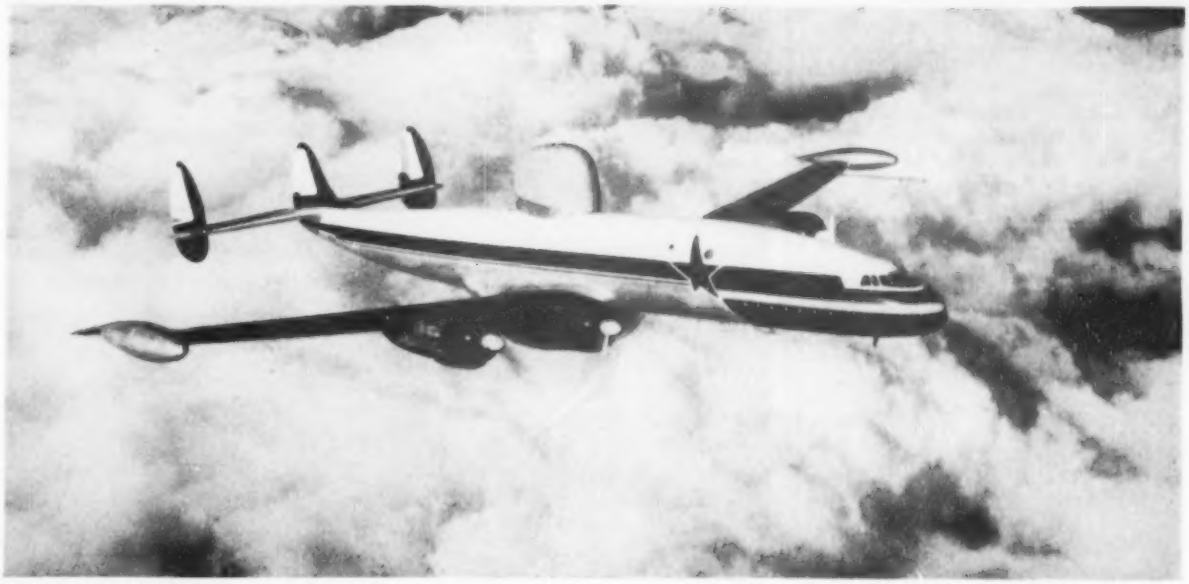
Pastushin Industries, Inc., 501 N. Prairie Ave., Hawthorne Calif., has issued 4-page, illustrated manual giving design and installation features of its Fluid-Tight jacketed and washered **self-sealing rivets** used in aircraft for repair of sealed assemblies. . . . Application and specification data on **linear actuators** is detailed in Bulletin F 4381-1 by Barber-Colman Co., Rockford, Ill. . . . Catalog 73 describes line of Micro **toggle switches** and their characteristics. Write to Micro Division, Minneapolis-Honeywell Regulator Co., Freeport, Ill. . . . 1953 Engineering Manual covers some 40,000 types and sizes of bare metal and cushioned **line support clamps, wire harness and multiple-support clamps** and related items, brackets, busbars and laminated anchor nut or reinforcing shims. The 64-page manual has 114 detailed prints and complete specifications covering materials and finishes in aluminum, steel and stainless. Write Thomas Associates at 4607 Alger St., Los Angeles 39.

Welding, brazing and soldering of aluminum, using 34 processes, is detailed in comprehensive 186-page manual distributed on request on letterhead to Reynolds Metals Co., 2500 So. Third St., Louisville, Ky.

Publications Received

• **1952 Aircraft Year Book**—Thirty-Fourth Annual Edition—Official Publication of Aircraft Industries Assn. of America, Inc. Editors: Fred Hamlin, Arthur Clawson, Eleanor Thayer, Robert McLarren. Published by Lincoln Press, Inc., 511 11th St. N. W., Washington 4, D. C. Price $6.00. Review of the events and developments in military and civil aviation in 1952.

• **Adventures in the Navy, in Education, Science, Engineering and in War—A Life Story** by W. F. Durand, pub. by the American Society Of Mechanical Engineers and McGraw-Hill Book Co., Inc., $4.00. Autobiography of Dr. William Frederick Durand. An account of the transition from sail to steam and from the first short flights of Wilbur and Orville Wright to jet propulsion faster than sound.



"BEAST OF BURBANK" flies military trials with dummy belly bathtub radar, shark-fin radome, tiptanks and bulging nose installation.

'Beast' Tests New Connie Developments

- **Lockheed's first Constellation chalks up impressive list of transport firsts, including 500-mph. dives.**
- **Grandfather airliner has stretched-out fuselage, often flies with three different engines and three prop types.**

By William J. Coughlin

Burbank, Calif.—The "Beast of Burbank," the somewhat decrepit grandfather of nearly 500 military and commercial Constellations and Super Constellations, still is haunting the skies of Southern California.

The "Beast" is the original Lockheed Constellation conceived in 1939, first flown in 1943, and then converted to a flying test bed which Lockheed engineers estimate has saved the company millions of dollars in development of the Connie series.

Although some of its plush grandchildren earn $5,000 a week, the "Beast" has never carried a paying passenger, has never earned a dime in revenue. There never have been more than 10 seats in it.

▶**P-38 Offspring**—Its crew calls it "the most uncomfortable airplane flying." It is not heated; it is not pressurized; it is noisy. Most of the windows are covered. At altitude, its crew must wear heavy flying clothes and oxygen masks. The interior looks like a cross between a plumber's nightmare and an apartment house storeroom.

Offspring of a P-38 fighter and forerunner of the graceful Super Constellations, it probably is the ugliest aircraft in the air today. But its history is one of the most unusual in aviation.

It has flown with as many as three kinds of engines at once. Its crew has trouble remembering just what type of propeller is on which engine.

▶**From Connie to Super**—The "Beast" was literally sawed into three pieces when Lockheed stretched it from a Constellation to a Super Constellation by increasing its length more than 18 ft. with the insertion of barrel sections fore and aft of the wing.

A wood and metal brow clings to the top of its forward fuselage to simulate the larger windshield configuration of the Super Constellation. It still is flying with the dummy radome in its belly used to develop the strange bathtub which gives the early warning radar WV-2s and RC-121Cs planes, that pregnant look (AVIATION WEEK Aug. 24, p. 17).

Also tested on the "Beast" was the high shark-fin radome of the military radar planes. That now has been sawed off and capped several feet above the fuselage, giving the aircraft the appearance of a slightly damaged fish.

▶**Dives 500 Mph.**—Its nose bulges with the test installation of nose radar now being installed in military versions of the Super Constellation.

Although one of its crew says, "We're over-cautious with it because it's kind of a dog," it has performed maneuvers most transports will never attempt, including dives of more than 500 mph.

"It didn't get stronger, we just got braver," explains a crew member.

Only a handful of pilots has flown this ugly duckling. Most airline crews would be a little puzzled by its jury-rig cockpit interior.

▶**How It Began**—Now known as the 1961S (S is for stretched), this Constellation prototype grew out of conferences in 1939 between Robert Gross, Hall Hibbard and Kelly Johnson of Lockheed, Jack Frye and Howard Hughes of TWA.

They decided the design objective would be an aircraft which could carry a 3-ton payload 3,500 mi. at a cruising speed close to 300 mph. at an altitude of 20,000 ft.

The entire wing design of Lockheed's P-38, first 400-mph. fighter, was taken as the wing for the Constellation, along with other features of the P-38, making

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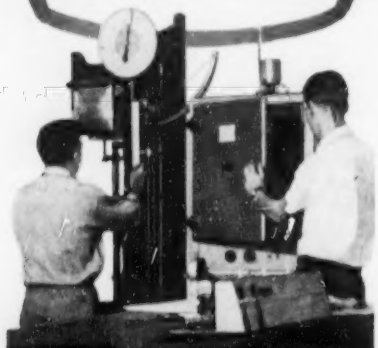

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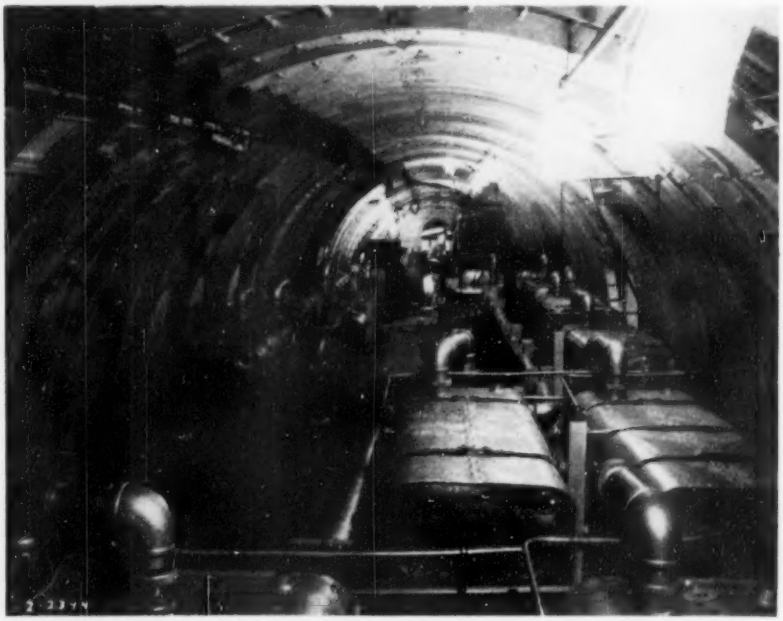
Send For Catalog SR-2

AS PROTOTYPE SUPER, laboratory transport grew 18.4 ft. longer than Connie.



WATER BALLAST TANK and complex plumbing change center of gravity in flight.

it one of the very few transport aircraft ever to grow out of a fighter design.

▶ **AAF's XC-69**—The "Beast" was completed in the closing days of 1942. High winds held up its initial flight for four days, but its first flight on a windy Jan. 9, 1943, was so successful six flights were made on the first day.

Although Pan American and TWA had placed large advance orders, the "Beast" was drafted into the Army Air Force as the XC-69 at the outbreak of World War II.

The plane was flown by the Air Force with both Wright R3350-35 and Pratt & Whitney R2800-C engines. After Air Force development testing, the "Beast" was covered with a tarpaulin and stowed during 1944 while Lockheed rushed its P-38 fighter production.

▶ **Postwar Use**—At war's end, the "Beast" was declared surplus and sold to Howard Hughes. Those who know the aircraft say it made only three flights in the more than a year that Hughes owned it: the short delivery hop across Los Angeles, one flight out of Culver City, and the flight on which it returned to Burbank. The rest of the time it sat on the airport at Hughes' Culver City plant.

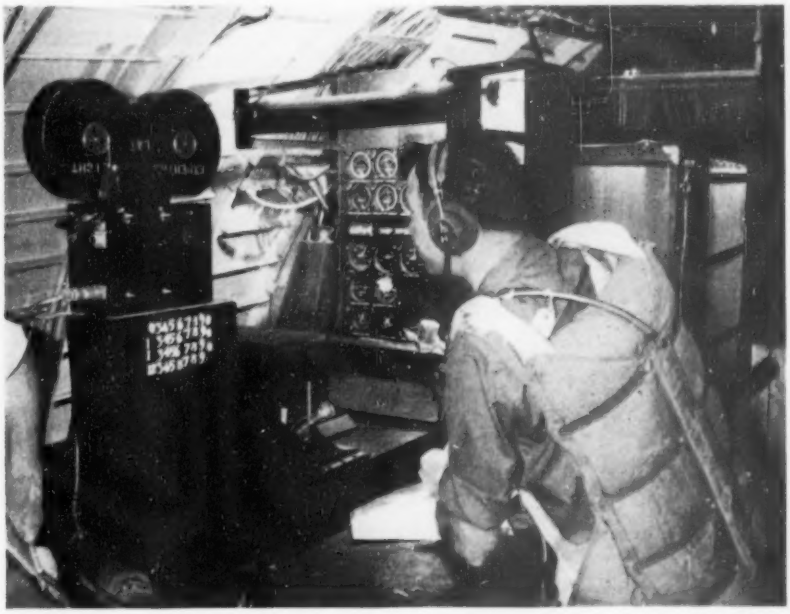
When Lockheed decided in 1950 to pre-test its 1049 design by stretching a Constellation into a Super Constellation, it discovered no Connies available.

Then Kelly Johnson remembered the "Beast," sitting idle at Culver City. Lockheed bought the plane from Hughes.

▶ **Saved Millions**—It was sawed in three pieces, the barrel sections inserted, and it became the first Super Constellation. In less than five months, Lockheed thus developed what was in effect a new airplane. Its first flight as a Super Constellation was Oct. 13, 1950.

With more than $100,000 worth of

THREE DIFFERENT powerplants and nacelles are installed on Lockheed's testbed.



CAMERA takes continuous photographic record of instrument panel on laboratory plane.

test equipment, plumbing and instrumentation packed into its plywood-floored interior, the "Beast" became a flying test bed for Super Connie development. Lockheed estimates this speeded development of the 1049 by many months, with dollar savings in the millions.

After tests with an assortment of engines, the "Beast" now is flying with a Wright R3350-DA Turbo Compound as No. 1 engine, a standard Wright R3350-CA as No. 4 engine and two Pratt & Whitney R2800s as inboard engines.

▶ **Turboprops**—Propellers now on it include Hamilton Standard 43E60-313, a 43E60-305 and two 33E60-79s. It has flown with two types of Curtiss and three types of Hamilton propellers.

What this variety of engines and propellers means to the flight engineer's panel is better left unsaid.

Future tests may find it with a turboprop engine in the No. 1 position, a Turbo Compound engine on the No. 4 nacelle and the Wright R2800s inboard.

▶ **Firsts**—This strange-looking aircraft has chalked up an impressive number of firsts:

- It was the first Constellation and the first Super Constellation.
- It was the first transport to fly with tiptanks.
- It was the first with giant radomes.
- It was the first to fly with Wright R3350s.
- It was the first to fly with a Turbo Compound engine.
- It was the only Constellation ever flown with thermal de-icing.

Although it is more than 10 years old, the aircraft has logged comparatively little time in the air. Its total flight time is only 767 hr.

▶ **Other Tests**—But a list of the development work done with the "Beast" is impressive. Control system improvements and Constellation de-icer boots were developed on this aircraft. It

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KELLY JOHNSON inspects wing tiptank installed for tests on Lockheed's "Beast."

tested new tension-type outer-wing panels for the Constellation series. Fuel tank sealing and radio antenna systems were developed with the "Beast." Basic ADF research was done with the plane.

Aerodynamic and ground taxi effects of tiptanks were tested. Gross weight of the "Beast" grew from 86,500 lb. to 92,000 lb.

"I was scared to death the time we went down the runway at 90,000 lb.," confesses Dick Stanton, foreman of flight test service for Lockheed's Transport Division who has nursed the "Beast" from its very first flight.

It has fathered even greater growth for the transport series. Lockheed's turboprop Super Constellations will have a 150,000-lb. gross takeoff weight. Super Connie weight thus has almost doubled as a result of tests with 1961s.

▶ **Gadgets**—Although the "Beast" has no air conditioning or pressurization systems, components for both systems were developed on this aircraft.

Its aileron and elevator surfaces were changed from fabric to metal. Cowl-flap configurations have been changed. Airscoop angles have been shifted.

The "Beast" is equipped with all types of airborne instrumentation, both quantitative and qualitative, including pressure and temperature instruments, strain gages, position indicators and vibration and flutter instruments. Cameras record data from these in flight.

Its complex plumbing allows the crew to shift the CG in flight or, if desired, change aircraft weight in flight by pumping water overboard. Lockheed believes this is the first aircraft to use such a large water ballast system.

▶ **Airspeed Changes**—Difficulties encountered in keeping up with the changing configurations are evident in changes in the airspeed system. Each configuration change requires an airspeed change. The aircraft is full of

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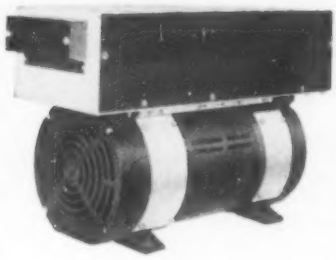

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INVERTERS—400 CYCLE OUTPUT

Type Number	INPUT		OUTPUT			Approx. Weight Lbs.	Max. Alt. Feet	Designed to Govt. Part No.
	Volts	Amps	Volts	Phase	VA Rating			
12128	27.5	1	26	1	6	5	35000	AN3496-1 AF
MG-54	27.5	22	115/200	1	250	18	65000	E-51A1A-9 Navy
				3	250			
12142	27.5	22	115	1	250	13	35000	N17158 Navy
				3	250			
12146	27.5	22	115	1	250	13	35000	53B6239 AF
MG-60	27.5	22	115	1	250	17	65000	53B6239 AF
MG-62	27.5	22	115	3	250	17	65000	AN3532-2
32E01	27.5	35	115	1	500	26	50000	AN3533-1
				3	500			
32E00	27.5	45-54	115	1	500	34	50000	AN3534-1
				3	750			
MG-44	27.5	55	115/200	1	750	35	50000	E-52804-2 Navy
				3	750			
MG-57	27.5	100	115/200	1	1250	42	50000	E1737-1 Navy
				3	1500			
MG-61	27.5	100	115	1	1500	51	65000	—
MG-64	27.5	100	115	3	1500	51	65000	—
1518 Mod. 1 & 2	27.5	130	115	1	1500	37.5	20000	—
				3	1800			
1518 Mod. 5	27.5	130	115	1	1500	37.5	35000	—
				3	1800			
32E06	27.5	180	115/200	1	2250	56	50000	E1725-1 Navy
				3	2500			
32E03	27.5	180	115	1	2500	56	50000	AN3516-1
32E09	27.5	180	115	1	2500	56	50000	—
				3	3000			

NOTE: D.C. input voltage shown is a nominal value of 27.5 volts, but all units are designed to operate from 26 to 29 volts. Input Amperes shown are values at 27.5 volt input.

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holes as a result of continuous efforts to find spots on the surface where pick-ups will give true ambient static pressure.

In flight, it often tows a Lockheed developed trailing airspeed bomb. Even though it's shivering, uncomfortable crew says, "It's no fun to fly the "Beast," Lockheed already has scheduled another 18 months of development and test flying for aviation's ugliest aircraft.

► **New Wrinkles**—The "Beast of Burbank" squats today on the ramp at Lockheed, ugly as sin, its paint weather-beaten and peeling, its weird configuration setting it aside from other aircraft around it, waiting for some engineer with a saw in his hand and the gleam of a new design wrinkle in his eye.

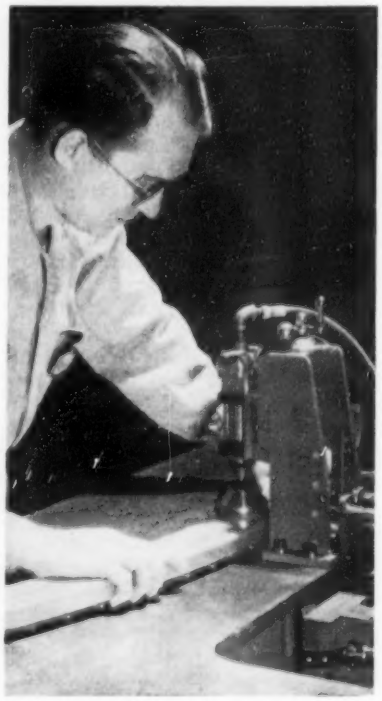
Then it will waddle out to the runway and heave itself into the air, testing a new development which some day may appear on more graceful airliners of the world.

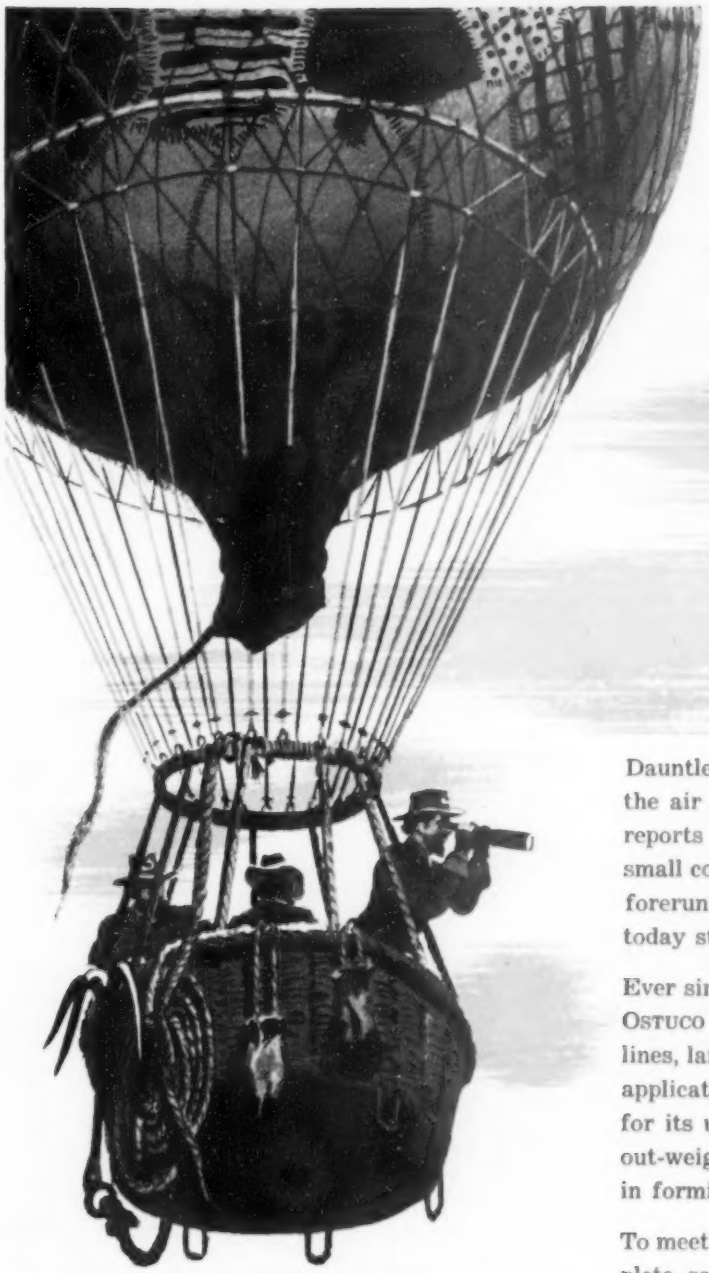
New Drill Speeds B-47 Production

A new index drilling machine used for rivet pilot holes on B-47 fuselage ribs is cutting about 78% of the time required for the former hand-drilling job at Boeing Airplane Co.'s Wichita plant.

Designed by Boeing's Everett Jones, the machine will work one part in 1 man-minute as against almost 7½ man-minutes for the old method.

In the drilling operation, the rib is placed on an index tool. A pin on the





THE "SILK DRESS" BALLOON — Critically short of many essential materials and badly in need of an observation balloon, the Confederate Army was said to have fashioned a patchwork balloon from silk dresses contributed by Southern women.

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Dauntless balloonists rode baskets high in the air during the Civil War, sending down reports on enemy camps and activities. This small corps, courageous but unsung, were the forerunners of our air force whose wings today stretch 'round the world.

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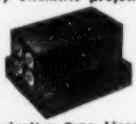

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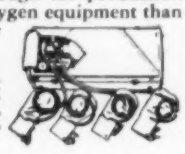


For complete information about the AVIOX write SCOTT AVIATION, 275 Erie St., Lancaster, New York.

tool is slipped into a coordination hole in the rib, which insures that all similar parts are drilled identically. Index pins along the side of the tool are located directly below the spots where the holes are to be drilled.

As both the tool and the rib are fed through the machine, the index pins engage the machine's cycling mechanism—two triggers. Tripping of the first trigger by a pin locks the second trigger. This locking stops the tool and the rib in position, while a pressure-foot descends to hold the rib firmly in place during the drilling.

When the hole is completed, the second trigger releases and allows the tool to be moved until the next index pin trips the first trigger to repeat the operation.

Vertical location of the hole is set by adjusting the drill head to a predetermined height above the table.

Hufford to Sell Northrop Curver

An exclusive license to manufacture and market a flexible stretch form block developed by Northrop Aircraft, Inc., has been given to Hufford Machine Works, Inc., El Segundo, Calif.

Hufford will manufacture the form block (AVIATION WEEK June 4, 1951, p. 37) as an auxiliary piece of equipment for their stretch presses. Originally designed for use with an A10 Hufford press in Northrop's factory, the form block is adaptable to other existing types of stretch press equipment, the aircraft firm points out.

It provides a flexible and economical method of producing small pre-production quantities of curved sections, Northrop says, and opens the way to handling of many varied curves without the uses of costly dies.

Big Stretcher Eases Aluminum Strains

A 5-million-pound-capacity stretcher —reported to be the world's largest—has been installed at Kaiser Aluminum & Chemical Corp.'s Trentwood, Wash., rolling mill.

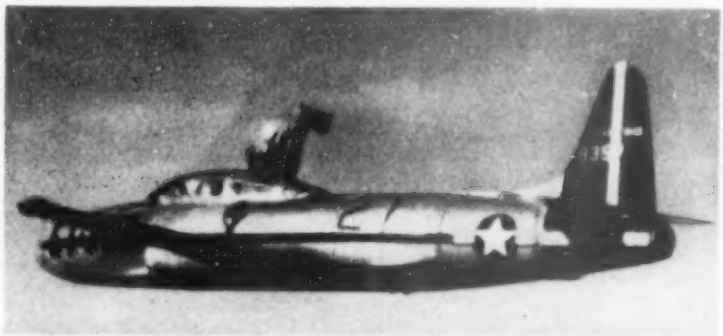
The new stretching machine is used to flatten high-strength aluminum alloy plate to relieve residual stresses from rolling and heat treatment.

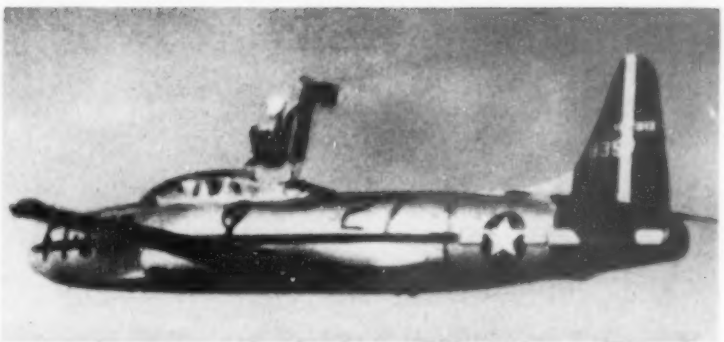
The stretching, accurately controlled, provides material which may be machined with a minimum of distortion, Kaiser says. The machine will handle plate up to 2 in. thick and 40 ft. long. It was manufactured by Watson-Stillman Co.

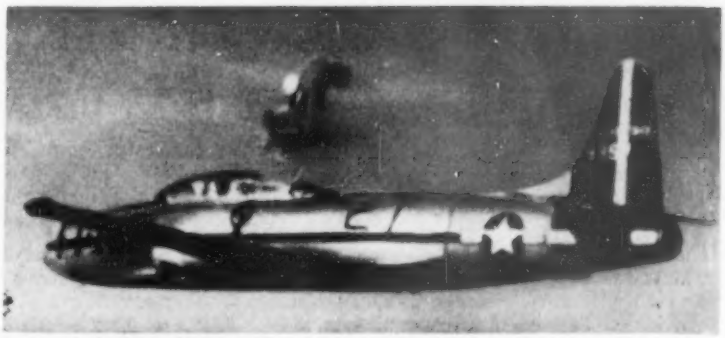
The initial deliveries of material handled on the unit already have been made to aircraft builders.

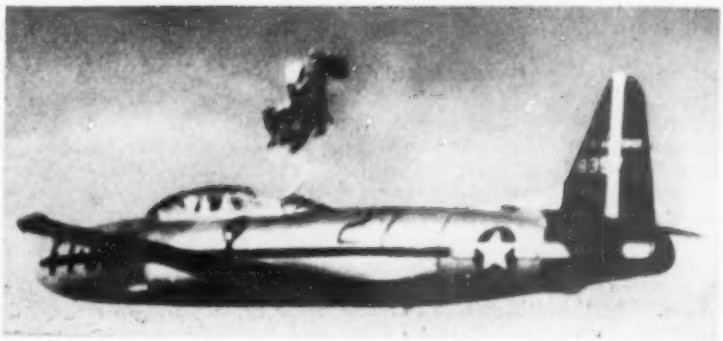
AF Tests Ejection at 500 Mph.

Dramatic photo sequence below shows an airman being ejected from the rear seat of a specially modified Lockheed T-33 jet trainer while the plane is traveling at an indicated 500-mph. airspeed at 25,000 ft. Tests of the ejection device were conducted by USAF's Wright Air Development Center. It is noteworthy that although the plane is traveling at high speed, the seat is maintaining its equilibrium as it hurtles clear of the airframe.









STRUCTURE REWORK SIMPLIFIED WITH OVERSIZE

hi-shear RIVETS

Structure rework nearly always requires replacement of fasteners. Because the pin diameter is slightly increased while retaining original head and collar end size, oversize HI-SHEARS avoid clearance problems that occur when the next larger size fasteners are used.

Diagrams show oversize HI-SHEARS in critical areas.

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same size HI-SHEAR head still clears nearby structure.

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no spotfacing or respotfacing required on radius to seat head.

FLUSH SURFACES
no enlarging of countersunk or dimpled holes when using oversize HI-SHEARS.

Approved for replacement, oversize HI-SHEARS weigh less than the next size fasteners or bolt-nut-washer combinations.

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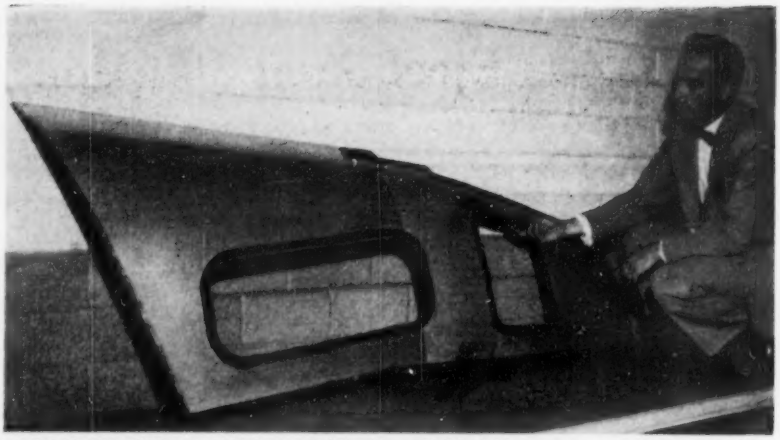
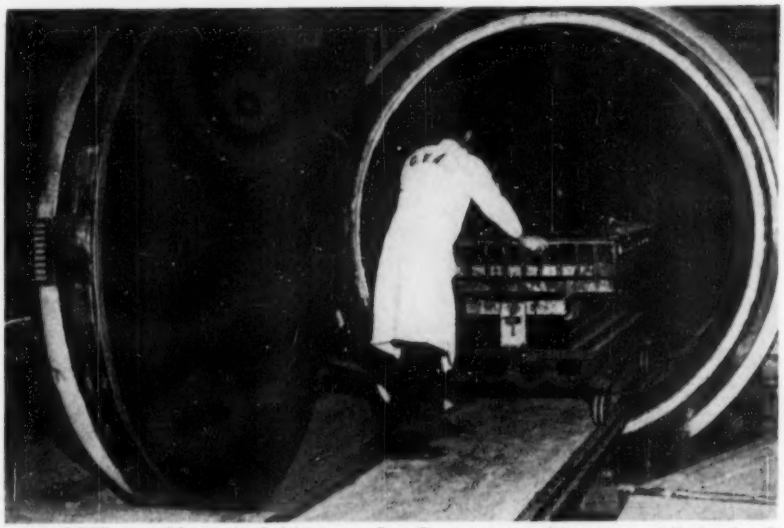


REDUX-BONDED panel is inspected by Dave Reid, CV structures materials supervisor.



METALITE assembly is wheeled into autoclave for pressure and heat cure of Redux bond.

Redux-Metalite Pays Off in F7U-3

Bonded sandwich construction cuts Chance Vought costs, simplifies structures, gives aerodynamic cleanness.

The Redux adhesive bonding process and Metalite sandwich construction are being used with notable success in the production of Chance Vought Aircraft's twin-jet F7U-3 Cutlass Navy fighter.

In a special report to AVIATION WEEK, Vought's supervisor of structures materials, Dave Reid, said Redux is being used in preference to other adhesive bonding processes because of its versatility, simpler processing requirements and high strength properties.

► **Bonding Advantages**—Redux is a two-component adhesive system, consisting of a thermosetting liquid and a thermoplastic powder. It is manufactured and marketed by Ciba Co., Inc.'s Plastic division. The liquid is sprayed on the surface to be bonded and while still wet is dusted with the powder. Applications of this adhesive in the de Havilland Comet and other foreign aircraft were outlined in AVIATION WEEK Apr. 6, p.48.

Bonded construction, Reid claims, is preferred to riveted or welded makeup in many instances, because of these advantages:

- **High strength-to-weight ratio.**
- **Aerodynamic cleanliness.**
- **Simplified structure.**
- **Reduced airframe costs.**

► **Background**—The Cutlass embodies many applications of Redux-bonded Metalite sandwich—two high-strength aluminum alloy facings bonded to an end-grain balsa core. Through the development of Metalite, Vought started using adhesives in primary aircraft structures back in 1943. Redux did not come

RECORD PERFORMANCE *

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Erwin Tuthill, Traffic Mgr., Avon Products, Inc., New York, reports on the famed Flying Tiger Advance Manifest System...
HERE'S THE LATEST TELETYPE ON AVON'S SHIPMENT ABOARD FLIGHT 903!...
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into the picture at Vought until 1945, when, as part of a general program of investigating adhesives for improved properties, lower costs and simplification, a laboratory evaluation of the material began.

► **Initial Trials**—A production process was devised and a pre-production run made on a few select panels. Amount of Metalite produced with Redux was gradually increased until, in 1949, Vought switched to the process entirely, Reid says.

First production applications were on the F4U-5 Corsairs—in the horizontal stabilizer, floor panels, engine intercooler flap doors and accessory compartment floors.

► **Metal-to-Metal Use**—Redux also is used extensively at Vought in the bonding of magnesium or aluminum structure—for doublers, inserts and beaded panels.

Metal-to-metal bonding with Redux, Reid says, has resulted in reduced costs where a large number of spotwelds would be used. Also, the bonded doublers give adequate thickness for countersinking flush-head rivets.

Versatility is another advantage. In one Vought application, metal, wood, Fiberglas and plastic materials are bonded together in a single operation, Reid reveals.

► **In the Field**—Service experience has been excellent. In Redux-bonded Metalite, there has been no loss in strength noted, no corrosion problems and no failure of the balsa core. Temperature-resistance is good in a wide range. Durability under environmental exposure (salt water, oils and fuel) also is good.

Extensive tests have been made with bonded construction in relation to service damage. Reid reveals that the tests indicate that structural efficiency of damaged areas can be restored with conventional sheet metal repair techniques.

Structures repaired by Navy mechanics have passed static tests at Vought.

► **Benefits**—Use of Metalite panels has brought various dividends. One important advantage is that they have reduced the complexity of changes. An example is the accessory compartment floor installation. When a decision is made to shift the location of compartment gear, the change can be made by simply drilling additional holes through the panels, obviating the consideration of doublers, reinforcing members or other relatively complicated construction.

In some applications, a weight saving is obtained, while in others there is a slight weight penalty, according to Reid. Thus, in the F7U-3 cockpit area, use of Metalite panels instead of magnesium

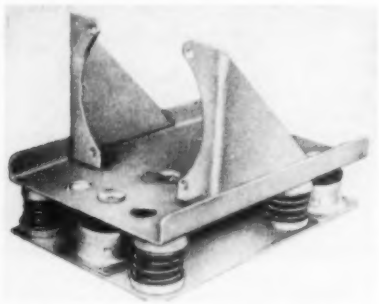
sheet-stringer construction added about 9 lb. But, more than offsetting the weight penalty, are these advantages:

- **About 2 cu. ft. of cockpit space is gained.**
- **Considerable riveting is eliminated.**
- **Metalite structure promotes pilot-safety in the event of an accident.**

In other Cutlass installations, designed from the start for Metalite, about 40 lb. in weight is saved by using the sandwich instead of the sheet metal construction.

► **Opinion**—In general, Reid believes that the aircraft industry has not realized completely the advantages to be gained by adhesive bonded construction, but feels that it is encouraging that interest in it is rapidly growing.

An important aspect, he points out, is learning how to design with adhesive bonded makeup and to understand how it can be used most efficiently. This can only be gained through experience and development programs providing detailed data on each design application and on processing methods, he claims.



Vibration Mount Permits Lightening of Instruments

A specially engineered mounting system developed by Robinson Aviation, Inc., reportedly permits considerable reduction in the weight, bulk and cost of airborne electronic instruments.

Called the single-stage mount, it is said to provide permanent protection against vibration and shock for cylindrical instruments such as the highly sensitive airspeed indicator. The new system incorporates an all-metal, fabricated cushioning material—Met-L-Flex.

Among advantages claimed for the unit are: excellent damping characteristics resulting in maximum stability during flight maneuvers and hard landings; low over-all height, facilitating installation in any part of the aircraft; and simplicity of attachment—only four attachment holes for installation.

In many instances airborne electronic instruments and equipment are now being "deruggedized" and lightened through use of this type of engineered mounting system, according to Robinson. Company address: Teterboro, N. J.

computers . . .

for fire control, bombing, gun data, navigation, and shoran.

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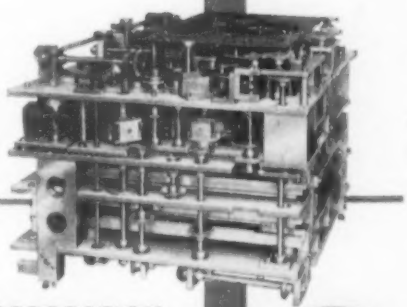

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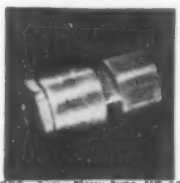
AI-11039, type BNC resistive termination plug. Weatherproof. Styrene Copolymer insert. Neoprene rubber gasket. Can be furnished with any desired impedance.

AI-11072, Army-Navy type UG-21D/U, improved type N plug for use with RG-8, 9, 9A, 10/U cables. Weatherproof. Teflon insert, neoprene mating seal gasket, silicon rubber cable clamp gasket.



AI-11070, Army-Navy type UG-154/U, type LC plug for use with RG-17, 18/U cables. Weatherproof. Silicon rubber gaskets.

AI-11032, Army-Navy type UG-27A/U, high voltage pulse receptacle pressurized. Ceramic insert, neoprene rubber gaskets.

AI-11022, special type BNC high voltage plug. Mates only with high voltage receptacles and jacks, for use with RG-59/U cable. Weatherproof. Teflon insert, Neoprene rubber gaskets.

AI-11000, Army-Navy type UG-358/U Klystron Coupler. Weatherproof. Styrene Copolymer and linen base bakelite inserts. For use with klystron tube 726C.

AI-11030, Army-Navy type UG-306/U, type BNC right angle adapter. One male, one female end. Weatherproof. Teflon inserts. Neoprene rubber gasket.

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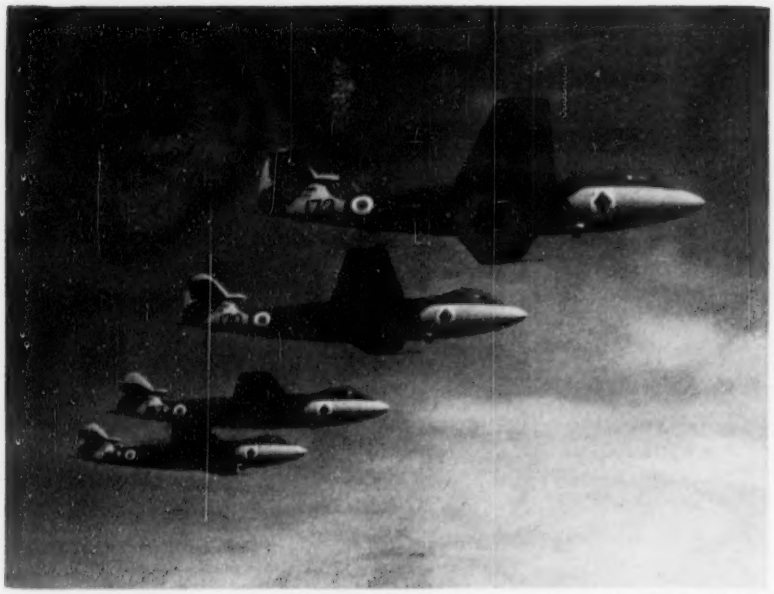
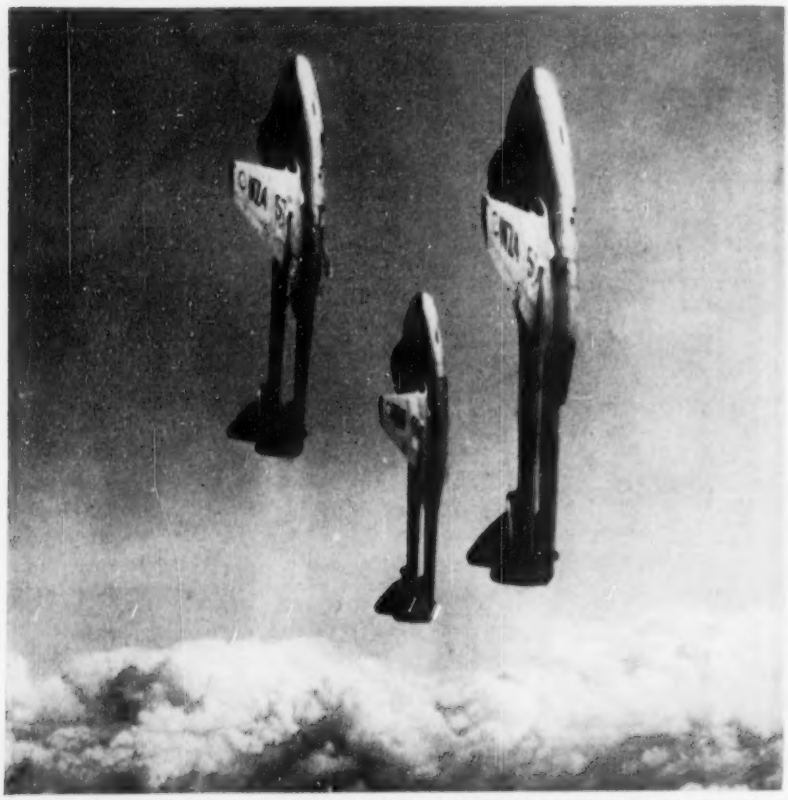


SEA HAWK formation by Royal Navy's top aerobatics unit. These Hawker carrier-based jet fighters recently became operational.

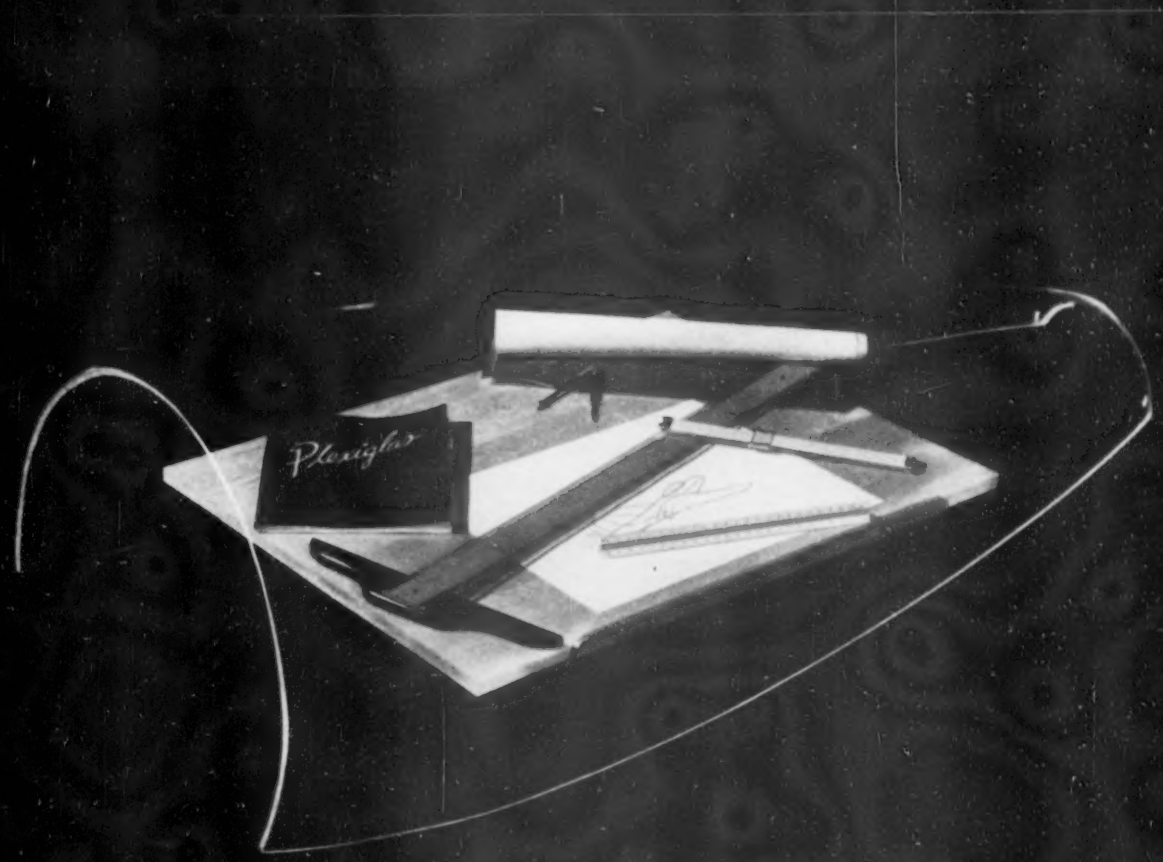
High Above the Clouds With New Foreign Planes

CF-100 all-weather fighter built by Avro Canada climbs steeply. The firm has completed its RCAF contract for Mk. 3 version ahead of schedule and is now making the rocket-armed Mk. 4 model.



VAMPIRE TRAINERS climb vertically in formation. The de Havilland jets seat instructor and pupil side-by-side.

SK. 50 SAFIR Swedish military primary trainers made by Svenska Aeroplan A. B. (Saab) have replaced biplane Buecker Bestmanns formerly used by Central Flying Training School.



Behind the PLEXIGLAS . . . *Proper Design*

● The combination of properties in PLEXIGLAS acrylic plastic—clarity, strength, formability, resistance to weather—have made it a by-word for canopies, noses, astradomes and other transparent enclosures on all types of aircraft.

Of equal importance with these properties is the design skill of aircraft engineers who determine the shapes to be formed, and the type and thickness of PLEXIGLAS to be used. They must relate stress-distribution, attachment techniques, and maximum service requirements to the known capabilities of PLEXIGLAS and to the over-all design of a plane.

The proper design of enclosures demands full knowledge of PLEXIGLAS. Over the years, Rohm & Haas Company, in addition to manufacturing an aircraft glazing material with the optimum balance of properties, has worked closely with the aircraft industry and the armed services so that plane designers will have a thorough understanding of acrylic plastic and can use the material to best advantage.

The Rohm & Haas Company manual, "Handbook for Aircraft Engineers", provides detailed physical data on PLEXIGLAS and outlines recommended practices in the design of transparent aircraft parts. Engineers who do not already have the revised (1952) edition are invited to write for a copy.

CHEMICALS FOR INDUSTRY

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PLEXIGLAS *is a trademark, Reg. U. S. Pat. Off., and other principal countries of the Western Hemisphere.*

USAF Contracts

Following is a list of recent USAF contracts announced by Air Materiel Command:

Air Associates, Inc., Teterboro, N. J., actuators and space parts, 1,150 ea., 116 ea., 106 ea., $351,866.

Aircraft Radio Corp., Boonton, N. J., receiver, 358 ea., radio receiver, 358 ea., transmitter, 306 ea., $489,084; shock absorber assy., 12,984 ea., snap slide, 37,271 ea., screw, locking, 6,605 ea., $27,369; mount, vibrator, 251,202 ea., oscillator assy., 2,102 ea., 1,970 ea., $255,081; radio receiver, 256 ea., shock absorber, 3,464 ea., cover tube, 343 ea., $75,281.

Airtron, Inc., 20 E. Elizabeth Ave., Linden, N. J., cable, 482 ea., box assy., 920 ea., cable, 723 ea., $401,272.

American Machine & Foundry Co., Div. of Leland Electric Co., 1501 Webster St., Dayton, motor generator, 826 ea., 77 ea., 305 ea., $1,535,431.

American Smelting & Refining Co., 120 Broadway, New York, smelting services, $250,000.

Avco Mfg. Corp., Crosley Div., Cincinnati, components, 202 ea., $78,026.

Bell Sound, Inc., 555 Marion Rd., Columbus, Ohio, counter-measures transmitting set, 67 ea., $218,715.

Bendix Radio Div., Bendix Aviation Corp., Baltimore, dimmer assy., 7,050 ea., drive assy., 259 ea., tuning assy., 1,963 ea., $117,063.

Boeing Airplane Co., Seattle 14, services, $1,468,009.

Capehart Farnsworth Corp., Fort Wayne, Ind., radar set, 12 ea., special tubes, $411,340.

Cessna Aircraft Co., Wichita, spare parts, $100,000.

Cutler-Hammer, Inc., Milwaukee, switches, toggle, 260 ea., 487 ea., 7,632 ea., $65,313.

Eicor, Inc., 1501 West Congress St., Chicago, dynamotor, 125 ea., 56 ea., 3,878 ea., $1,000,584.

Fairchild Camera & Instrument Corp., Robbins Lane, Syosset, L. I., N. Y., type T-11 cameras, 119 ea., magazines, 28 ea., 24-in. cone, 6 ea., $683,566; 12-in. cone assemblies, 53 ea., $250,744; camera system, data, 6 ea., 30 ea., spare parts, $5,321,476; C-1 bodies and magazines, 888 ea., C-2 & C-7 bodies, 1,461 ea., spare parts, maint. tools, etc., 1,461 ea., $2,417,118; camera, 60 ea., camera systems, 26 ea., spare parts, $725,575.

General Electric Co., 1 River Rd., Schenectady, N. Y., controller, 8 ea., switch assy., 422 ea., ignition unit, 624 ea., $320,959; spare parts, $313,766.

B. F. Goodrich Co., 803-4 Winters Bank Bldg., Dayton 2, wheel assys., 321 ea., 175 ea., brake assys., 287 ea., $770,610.

Gordon Enterprises, 5362 North Cahuenga Blvd., North Hollywood, Calif., sight, gun camera bore, 175 ea., 98 ea., $35,817.

Guardian Electric Mfg. Co., 1621 W. Walnut St., Chicago, control stick switch, 5,059 ea., gun-bomb-trim tab-radar, 4,184 ea., $281,229.

Kollsman Instrument Corp., 80-08 45th Ave., Elmhurst, N. Y., indicators, 102 ea., $30,088; motor-telegon, 380 ea., 66 ea., tank assy.-case, 115 ea., $26,327.

Lear, Inc., 110 Ionia Ave., N. W., Grand Rapids 2, Mich., components, automatic pilot system, spare parts, $1,942,682.

Lundy Mfg. Corp., 36-08 33rd St., Long Island City, N. Y., armature, 1,019 ea., nut, 4,151 ea., cover, 1,868 ea., $173,613.

Magnavox Co., 2131 Bueter Rd., Ft. Wayne, Ind., motor, 680 ea., rotor, 2,796 ea., shield, 5,439 ea., $65,244; control assy., bomb arming, 12,936 ea., $40,748.

Minneapolis-Honeywell Regulator Co., 2600 Ridgway Rd., Minneapolis 13, adapter, attitude trim, 382 ea., 27 ea., 43 ea., $243,007; components, spare parts, special tools & test equipment, $7,901,169.

Piasecki Helicopter Corp., Morton, Pa., helicopters, 105 ea., $3,000,000.

Piqua Engineering Co., Inc., 112 E. Ash St., Piqua, Ohio, magazine, 32 ea., reel assy., 345 ea., shaft distributor, 520 ea., $29,476.

Platt Mfg. Corp., 489 Broome St., New York 13, dimmer assy., 7,000 ea., oscillator assy., 1,873 ea., $36,291.

Seaboard Electric Co., 417-421 Canal St., New York, procurement of 0-5 servo control, 73 ea., 7 ea., 26 ea., $69,171.

Sensenich Corp., Lancaster, Pa., propeller assembly, 200 ea., 310 ea., 155 ea., $40,889.

Sperry Gyroscope Co., Div. of Sperry

Now the F-84F Thunderstreak "talks back to" the pilot . . . actually gives him the feeling of Flight Control through the wheel in his hands. All this is possible with the assistance of the Aileron Box Assembly.

Considered as a production item, the Aileron Box Assembly requires light weight nonferrous castings, machining, the purchasing and inspection of other components and finally the assembling into a finished unit, to specifications, ready for installation on the airframe. Complete facilities permit South Gate to assume full responsibility. South Gate invites correspondence concerning your companies requirements. We are equipped to handle your Aluminum or Magnesium castings or complete sub-assembly.

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South Gate Aluminum & Magnesium Co.

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SHOCK-RESISTANT RELAY

Shocks up to 100G are withstood by this tiny, hermetically sealed relay only ¾ in. in diameter. Using palladium silver contacts rated up to 2 amp. inductive load, the unit is sealed in a metal can and uses a standard seven-pin plug-in base. The relay, made by Polytron Engineering, 32 W. Biddle St., Baltimore, Md., is available in coil resistance from 400 to 1,000 ohms.

Corp., Great Neck, L. I., N. Y., components, 208 ea., 832 ea., 208 ea., $2,658,116.

Ford Instrument Co., Div. of the Sperry Corp., 31-10 Thomson Ave., L. I. City, N. Y., indicator, 399 ea., $7,163,932.

Stanley Aviation Corp., Buffalo Municipal Airport, Buffalo 25, N. Y., belt, aircraft, safety, lap, 17,121 ea., $1,074,685.

M. Steinthal & Co., 222 Fourth Ave., New York, belt, lap, safety, 3,840 ea., belt, lap, backward, 2,900 ea., safety belt, 131,664 ea., $925,653.

Vare Mfg. Co., Inc., 1801 Walnut St., Garland, Tex., gun bomb rocket sight, 270 ea., 230 ea., 324 ea., $483,214.

Viewlex, Inc., 35-01 Queens Blvd., Long Island City, N. Y., projector sets and accessories, 524 ea., $164,777.

Vogt Bros. Mfg. Co., 1402 W. Main St., Louisville 3, Ky., rack, bomb, 5,263 ea., 2,500 ea., 1,952 ea., $724,894.

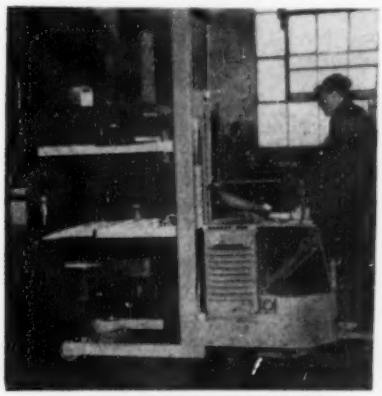
Wolverine Diesel Power Co., 12700 Mansfield, Detroit 27, powerplants, 3 ea., 299 ea., spares, $2,807,511.

Fast Writeoffs

Accelerated tax amortization for manufacturers expanding their defense facilities is granted by the government in the form of certificates of necessity.

In the following list of recent certificates, company name is given, followed by product or service, cost of construction deemed necessary for defense expansion, and the percentage of the expansion cost allowed for fast writeoff. Fast writeoff permits property to be depreciated in five years.

- **Westholt Mfg. Inc.,** Wichita, Kan., aircraft parts, $13,912, 45%.
- **Northrop Aircraft, Inc.,** Hawthorne, Calif., aircraft & aircraft parts—missiles, $233,930, 60%.
- **Ryan Aeronautical Co.,** San Diego, Calif., airplane parts, $28,225, 65%.
- **H. W. Loud Machine Works, Inc.,** Pomona, Calif., aircraft ass., $232,011, 70%.
- **Douglas Aircraft Co., Inc.,** Santa Monica, Calif., aircraft, $110,000, 80%.
- **Swedlow Plastics Co.,** Los Angeles, Calif., aircraft parts, $12,357, 70%.
- **Wells Aircraft Parts Co.,** Los Angeles, Calif., aircraft components, $80,802, 70%.
- **Aluminum Taper Milling Co., Inc.,** El Segundo, Calif., tapered aluminum sheets for aircraft, $114,192, 80%.
- **Goodyear Aircraft Corp.,** Litchfield Park, Ariz., airship parts, $86,990, 65%.
- **Lockheed Aircraft Corp.,** Burbank, Calif., aircraft & spare parts, $65,514, 60%.
- **Bell Aircraft Corp.,** Fort Worth, Texas, military helicopters, $250,000, 60%.
- **Meisel Press Mfg. Co.,** Boston, Mass., aircraft parts, $18,000, 70%.
- **Vosa Co.,** New Haven, Conn., aircraft components, $12,252, 70%.
- **Plane Parts, Inc.,** New Haven, Conn., aircraft parts, $28,076, 70%.
- **United Aircraft Corp.,** Pratt & Whitney Aircraft Div., East Hartford, Conn., aircraft engines, $3,360,000, 65%.
- **Waldorf Instrument Corp.,** Huntington, N. Y., aircraft parts, $24,292, 70%.
- **Bendix Aviation Corp.,** Sidney, N. Y., aircraft components, $458,443, 40%.
- **Republic Aviation Corp.,** East Farmingdale, L. I., N. Y., aircraft spare parts, $152,000, 40%.
- **Walter Kidde & Co., Inc.,** Belleville, N. J., aircraft equipment, $319,552, 65%.
- **Thomas A. Edison, Inc.,** West Orange, N. J., scientific instruments for aircraft, $30,333, 65%.
- **American Non-Gran Bronze Co.,** Berwyn, Pa., aircraft parts, $37,958, 70%.
- **Vinco Corp.,** Detroit, Mich., aircraft assys., $140,280, 45%.
- **Aeroquip Corp.,** Jackson, Mich., aircraft parts, $91,862, 70%.
- **Elbeco, Inc.,** Jackson, Mich., aircraft parts, $61,049, 70%.
- **Goodyear Aircraft Corp.,** Akron, Ohio, aircraft and parts, $544,835, 65% ; airships, $41,250, 65%.
- **United Aircraft Products, Inc.,** Dayton, Ohio, aircraft parts, $124,780, 50%.
- **Bowden Grinding, Inc.,** Cleveland, Ohio, aircraft parts, $10,055, 70%.
- **Dundick Tool Works, Chicago, Ill.,** aircraft parts, $10,199, 70%.
- **Crown Central Petroleum Corp.,** Houston, Tex., aviation alkylate, $2,493,535, 100% ; $561,393, 50%.



SPEEDS DIE CHANGING

Double-tier lift truck cuts machine downtime when exchanging dies. Single truck picks up new die from storage, carries it on lift's top shelf to machine, scoops old die onto bottom shelf of truck, then positions new die in machine, all in one trip. Truck is made by Market Forge Co., 25 Carvey St., Everett, Mass.

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Microtomic

Designed especially for engineers and draftsmen, precision-made MICROTOMIC Drawing Pencils meet every requirement. The result of over a century of pencil-making "know-how" backed by constant Eberhard Faber research. See the difference—prove it to your satisfaction!

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Only Microtomic gives you all these features:

- **HI-DENSITY LEADS** Lines are opaque to actinic rays of high speed 'printers'.
- **ABSOLUTELY UNIFORM** Every Microtomic of the same degree marking is identical.
- **NEW DUSK GRAY** Scores of professional men acclaimed it the best color for a drawing pencil.
- **BULL'S EYE DEGREE MARKING** Easier to read . . . quicker to find—positive identification.
- **ALSO**—Choice of Holders and Microtomic Drawing Leads.

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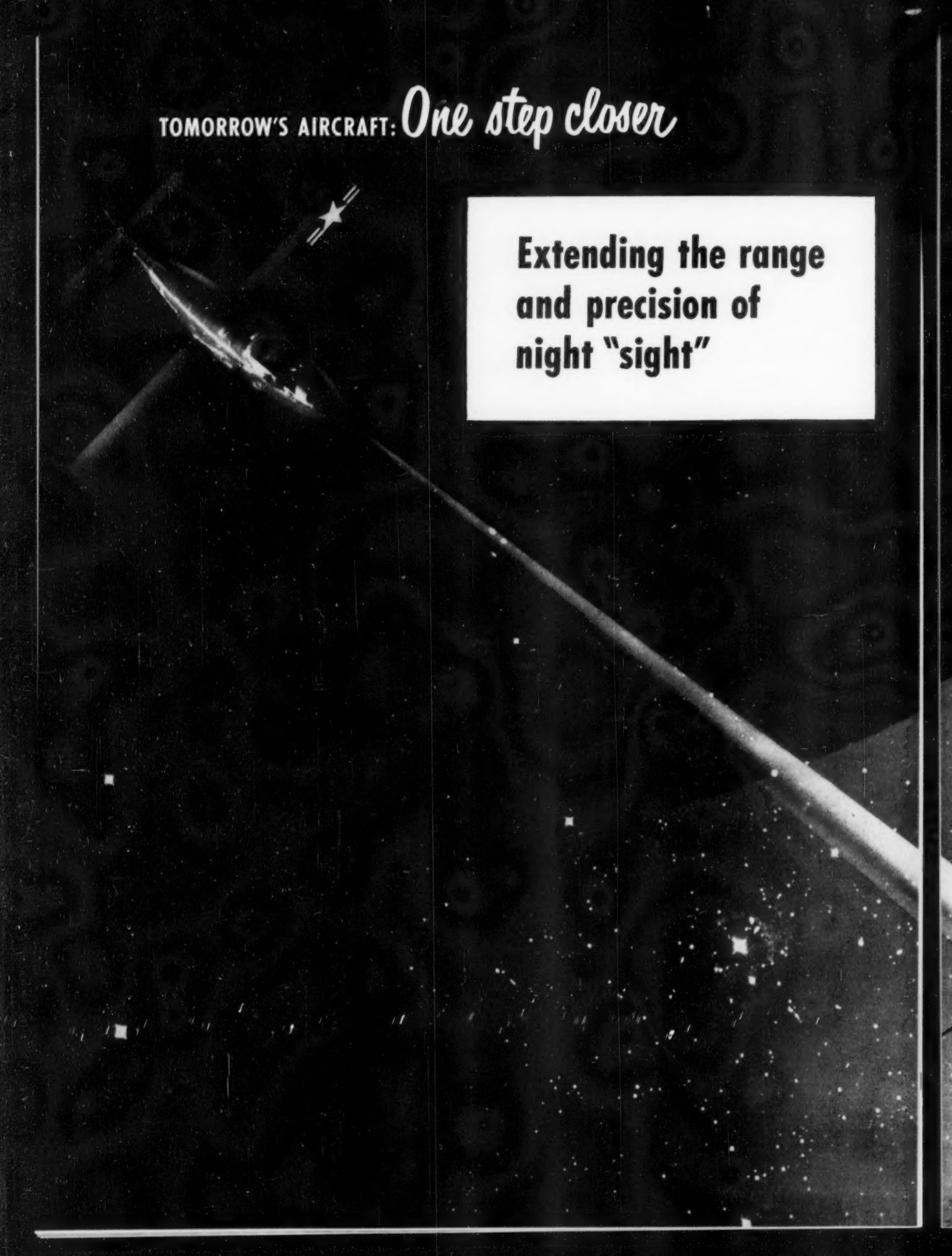
TOMORROW'S AIRCRAFT: *One step closer*



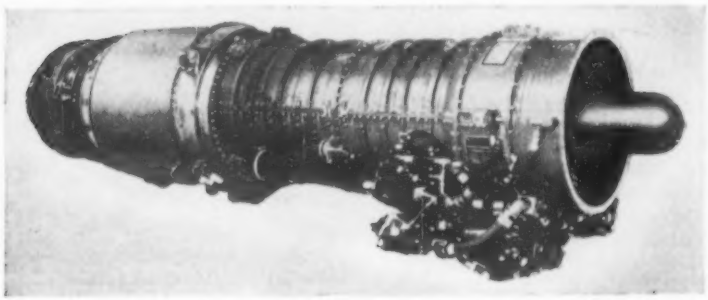
Extending the range and precision of night "sight"

Westinghouse has added a deadly punch to military aircraft with exceptionally accurate electronic "eyes" which can seek out opponents under the toughest visibility conditions.

The Intercept and Fire Control Radar detects a target and permits the pilot to identify it as friend or foe. When necessary, the system presents continuous, pin-point fire control information. The same radar guides the pilot safely back to his base.

Westinghouse Radar and Fire Control Systems are being used in the U. S. Navy F3D Skynight and have been proved under combat conditions by confirmed victories during night and all-weather operations. Making this product do the job required specialized technique and ability to develop highly accurate and reliable air-borne equipment, yet surmount critical limitations of space, weight and power.

These results come from the Westinghouse wholly owned Air Arm Division, with its twelve years of air-borne radar experience and unparalleled facilities for complete development, production and flight testing. The Air Arm's new plant at Baltimore's Friendship Airport produces the Autopilot, complete fire control system, computers and guided missile components and systems. By concentrating its extensive capabilities on advanced Avionic applications, Air Arm brings tomorrow's aircraft One Step Closer. J-91007



Westinghouse has brought a two-fisted punch to the F3D Skynight—all-weather fighter. It uses two J-34 turbojet engines developing over 6800-lb. thrust, powering it to operational speeds in excess of 500 mph.

THE SCOPE OF WESTINGHOUSE IN AVIATION

Basic aircraft systems
Turbojet Engines, Fire Control, Radar, Autopilots, Communication Equipment and Electrical Systems.

Ground equipment
Wind Tunnels, Airport Lighting, Industrial Plant Apparatus.

Air-borne system components
Transformers, Rectifiers, Instruments, Gyro-motors, Temperature Control Panels, Generating Equipment and System Control, Circuit Breakers, Contactors, Motors, Actuators and Hoists, Electronic Tubes, Magamps, Micarta®.

YOU CAN BE SURE... IF IT'S

Westinghouse

F-86D Flies With 'Automatic Engineer'

- **GE unit controls both engine and afterburner.**
- **So pilot can concentrate on interception mission.**

By Philip Klass

Schenectady, N. Y.—The F-86D pilot is one of the busiest men in the Air Force. He flies one of the USAF's hottest jets and operates a complex radar fire control system—tasks performed by a two-man crew on other AF interceptors (F-94C and F-89D).

If it weren't for an avionic assist rendered the pilot by General Electric's new automatic engine control system, the dual assignment might stretch human capabilities to the breaking point. The 123-lb. GE system, employing approximately 40 vacuum tubes, might aptly be called an "automatic flight engineer."

A GE spokesman describes the operation of the engine control this way: "The pilot merely tells the system how much thrust he wants and it automatically adjusts the engine and afterburner controls to deliver the required thrust as quickly as possible without exceeding safe engine rpm. or temperature."

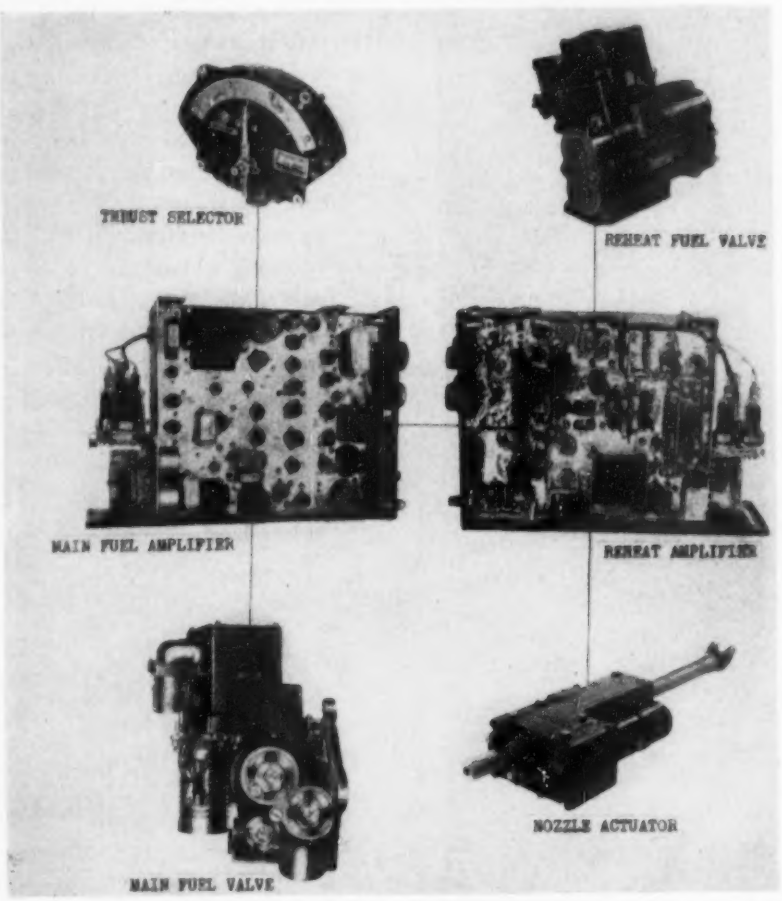
▶**First Production System**—Automatic and semi-automatic controls for dry engines (without afterburners) are not new, but GE's system is the first integrated control for both main engine and afterburner to see use in a production airplane, the company says.

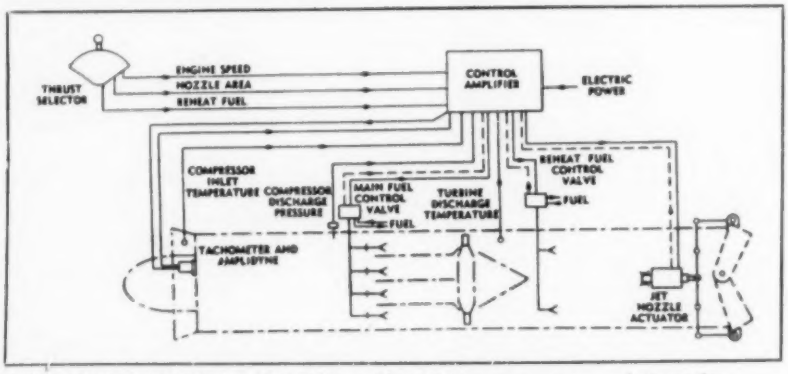
The main engine and its afterburner are really two engines in tandem, with the performance of each affecting the operation of the other. Designing a system which enables these two thrust producers to function as a single integrated engine is much more difficult than designing individual controls and depending upon the pilot to perform the necessary integration.

When the pilot changes his throttle setting, the system must instantly establish new fuel-flow rates to the main engine and to the afterburner (if in use), as well as repositioning the variable-area discharge nozzle. This it must do without exceeding safe engine speeds and temperatures and without risking "flameout."

▶**How It Operates**—In the F-86D, the pilot controls the thrust of the GE J47-17 engine and afterburner from a single throttle quadrant, or thrust selector. When he positions the throttle to the "start" position, the GE system starts the flow of fuel to the main engine, ignites it, and then accelerates the engine to idling speed in the shortest possible time.

For takeoff, the pilot can shove the throttle all the way forward without danger of damaging the engine. The GE engine control will increase fuel flow to the main engine and partially close the variable-area nozzle, accelerating the engine to rated rpm. as quickly as possible. When the engine reaches





AUTOMATIC ENGINE CONTROL enables pilot to concentrate on interception.

rated speed, the engine control system automatically starts the afterburner, momentarily preventing any increase in main engine fuel flow to prevent excessive tailpipe temperature. The system then increases afterburner fuel flow, while opening the variable-area nozzle until full thrust is achieved.

▶**Payoff in Combat**—The automatic engine control really pays off in combat when the F-86D pilot has his eyes glued on the radar scope of his fire control system. When he needs an added burst of power and shoves the throttle full forward the pilot can't afford to look up from his radar scope to watch engine rpm. and temperature indicators. The GE system continuously monitors engine performance and, by sensing various engine conditions, is able to take corrective action before safe operating limits are exceeded.

(A GE spokesman admits that F-86D pilots were leery at first about shoving the throttle ahead instead of nursing it forward slowly, particularly when they saw engine rpm. and temperature gages advancing rapidly. However, he says, pilots now have complete confidence in the system's operation.)

The system incorporates many automatic safeguards. For example, when the pilot cuts back on the throttle setting, the system is designed to provide maximum engine deceleration without danger of "flameout." When the pilot calls for maximum thrust, the system accelerates smoothly and rapidly. If too much fuel is being supplied, temperature-sensing devices will cause the system to throttle back automatically.

▶**Measuring Engine Performance**—The GE automatic engine control system measures and takes into account a variety of engine operating conditions to determine optimum fuel-flow rates and discharge nozzle position. These include:

- **Engine rpm.**
- **Tailpipe temperature.**
- **Compressor inlet temperature** (measured at first stage).
- **Compressor discharge pressure** (leaving final stage).
- **Main engine fuel-flow rate.**
- **Afterburner fuel-flow rate.**
- **Discharge nozzle position.**

▶**Fast Response Needed**—The most difficult aspect of the engine control problem occurs during transient conditions, when the system must provide fastest possible acceleration or deceleration within safe engine operating limits. Temperature and pressure sensors must be designed to withstand the hot, high-speed gases, yet must be capable of responding instantly to changing conditions within the engine.

This posed quite a problem in the design of thermocouples used to measure tailpipe temperatures. Enclosures which protected the thermocouple from its rugged environment tended to introduce errors in temperature measurement or slow down response time. GE experimented with a variety of thermocouple designs before it found a suitable one.

▶**Started in 1947**—Original development of the integrated engine control system, a product of GE's Aeronautic & Ordnance Systems Division, began in 1947. The development was carried on in parallel with the design of the F-86D's J47-17 engine at GE's Aircraft Gas Turbine Division. A. & O. S. engineers worked closely with AGT engineers to tailor the control system to the J47-17's particular operating characteristics. In 1951, production systems were coming off the line.

The amplifiers for these first systems were constructed in pressurized cases to prevent arc-over between pins on two tube types at the extreme altitudes at which the F-86D was to operate. When these pressurized amplifiers without external ventilation were mounted in the engine section, they met with ambient temperatures of 200F, considerably beyond the ratings of components then available. The result was a rash of tube and component failures.

The amplifiers have since been redesigned to use ventilated enclosures and new tubes capable of operating at high altitudes. The ventilated amplifiers not only have cleared up tube and component failures, but reduced overall system weight by approximately 40 lb.

The present GE system consists of the following components:

- **Main engine amplifier.**
- **Afterburner amplifier.**
- **Main fuel valve** (motor actuated).
- **Afterburner fuel valve** (motor actuated).
- **Thrust selector** (operated by linkage and flexible cable from pilot's throttle, contains potentiometers which generate initial signals for more or less fuel flow and discharge nozzle area.)
- **Compressor inlet temperature sensor.**
- **Compressor discharge pressure sensor.**
- **Discharge nozzle actuator.**
- **Junction box.**
- **Tach-amplidyne generator.** (A tach generator and an amplidyne generator are built on a common shaft and driven from a single engine pad. The tach provides a signal proportional to engine rpm.; the amplidyne is used to raise the power level of amplifier signals sufficiently to operate the discharge nozzle actuator motor.)

The ring of thermocouples which measures tailpipe temperatures are functionally a part of the system but are produced by GE's Meter and Instrument Division which supplies them directly to the AGT division.

It takes dozens of wires to interconnect these components into a system and GE admits that North American

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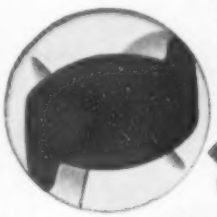
Installed in panel in closed position and door removed from companion doubler.



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Has wide application in aircraft sheet metal structures where a simple, flush, removable plate is required. The flush access doors are removed by a simple quarter turn to release and an additional quarter turn raises door out of circular cut-out in panel. The doubler eliminates necessity of making difficult cut-out in doubler sheet and is installed by riveting or spot welding. Available without mounting holes or with variety of hole spacing to conform with strength requirements and rivet patterns. Door diameter is 1¾" and doubler provides accessible area of 1" x 1½". Access doors available in various metal thicknesses from .020" through .091" standard metal gages. Weights from .33 oz. to 1.15 ozs. Doubler furnished in stainless steel or Alclad aluminum alloy.

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Aviation was a little unhappy over the prospect at first. However NAA and GE have jointly worked out simplified wiring and trouble-shooting methods.

▶ **The Future**—With the memory of previous temperature troubles still fresh, and the prospect of even higher ambient temperatures in newer aircraft, A. & O. S. is developing systems that are basically mechanical-hydraulic, retaining avionic circuitry only where extremely short time constants are required. However, work still is continuing in the field of electrical engine control systems, with particular emphasis on improvement of component temperature characteristics.

The division has another program under way to develop standardized components and devices which can be applied to a variety of engines with a minimum of tailor-made circuitry. The program is aimed at reducing the time required to develop automatic control systems for new jet engines.

New Potentiometers

Four potentiometer manufacturers have announced new additions to their lines in the form of smaller and/or more accurate potentiometers. These include:

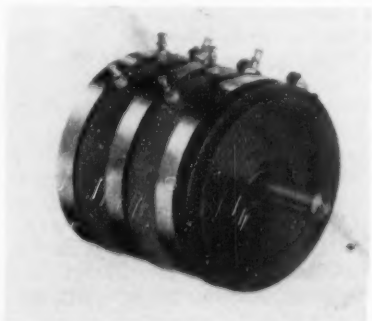
• **Electro-Mec Laboratory.** New Model

1418 has 1.4-in. dia., is 1 in. long, weighs less than 2 oz., and offers linearity to 0.1% and resolution down to 0.03%, according to the manufacturer. Units are available with resistances of 100 to 350,000 ohms, rated at 3 watts with a multiplicity of taps and brushes, if desired. Potentiometer rotation up to 360 degrees is available. Electro-Mec Lab., 19 Murray St., New York 7, N. Y.

• **G. M. Giannini Co.** New linear-motion potentiometer, Model 8620, is available with strokes of 0.5 to 5.25 in., linearities of 0.5% or better, and with total resistance values of 400 to 15,000 ohms per inch of stroke. Called the

Rectipot, company says the device can operate in the temperature range of −55C to 71C. G. M. Giannini Co., 117 E. Colorado St., P. O. Box N, Pasadena 1, Calif.

• **Helipot Corp.** New Model Y series is 1¼ in. in dia. and weighs 3 oz. Linearity is quoted at 0.5% or 0.25% on



special order in the range of 50 to 50,000 ohms. Up to 14 potentiometers

(Continued on p. 55)

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Volume production now overcomes Cost and Delivery barriers on high performance Gyroverticals

With Model 69, Summers now offers an accurate, responsive, lightweight, rugged gyrovertical—at a price heretofore unheard of. Model 69 is used to establish the basic reference element for aircraft and missile automatic control systems. It incorporates revolutionary Summers principles that are government proved and accepted.

Model 69 is now in volume production in the Summers plants. Quantities of 200 or more shipped within 10 days; smaller quantities immediately. Write today to Department A-2.

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Two 2000 ohm Potentiometer Pickoffs
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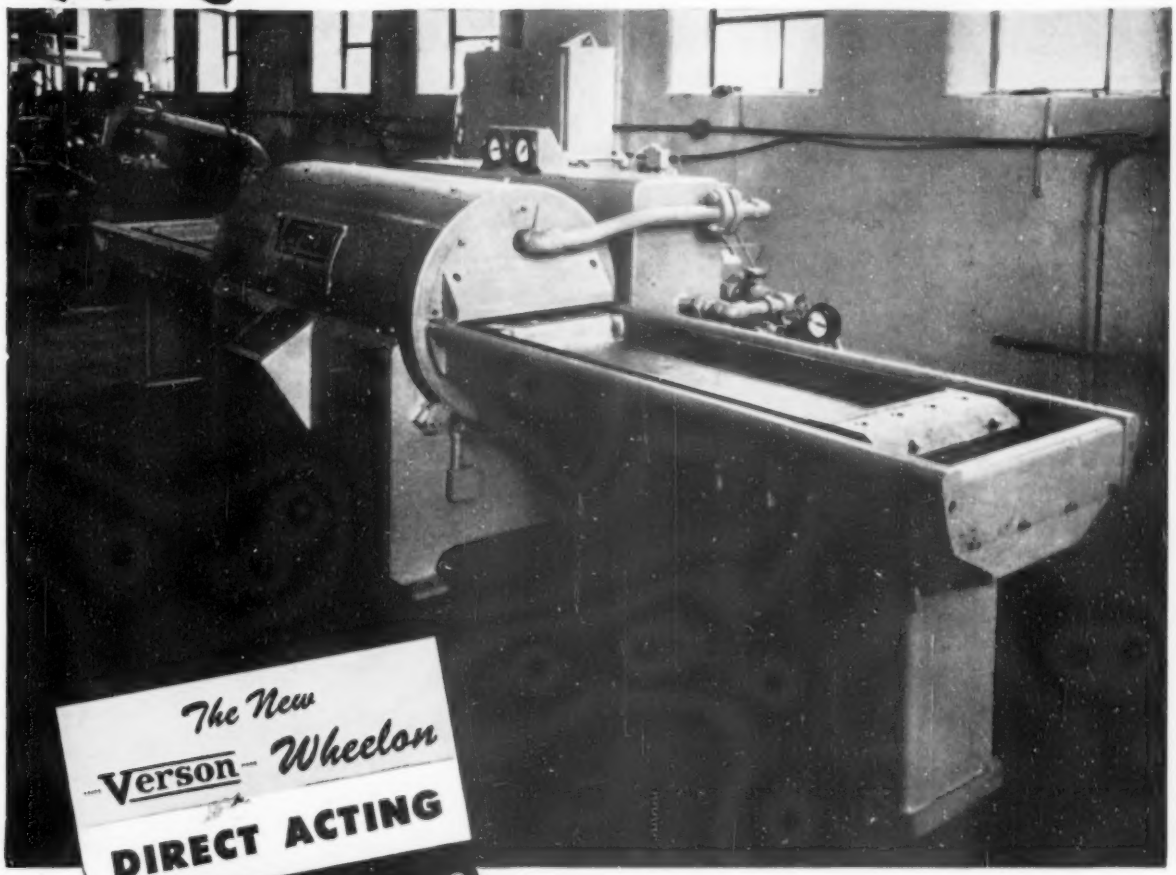

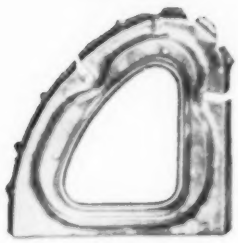

Formed in a conventional rubber pad press.

Formed in a Verson-Wheelon press.

To meet the demand for a more efficient, more economical method of rubber pad forming of metal, Verson now offers the Verson-Wheelon Direct Acting Hydraulic Press. With this revolutionary new method, it is possible to exert forming pressures many times as great as the practical maximum with a conventional rubber pad press. The small press above, for example, operates at 5000 psi, equivalent to a rated tonnage of 2500. The photos at the left show the superior forming detail.

The advantages of the Verson-Wheelon method are—complete forming of flanges, eliminating hand finishing . . . lower first cost . . . elimination of expensive machine foundations . . . minimum plant space requirements.

Write for bulletin VW-52 which gives further details.

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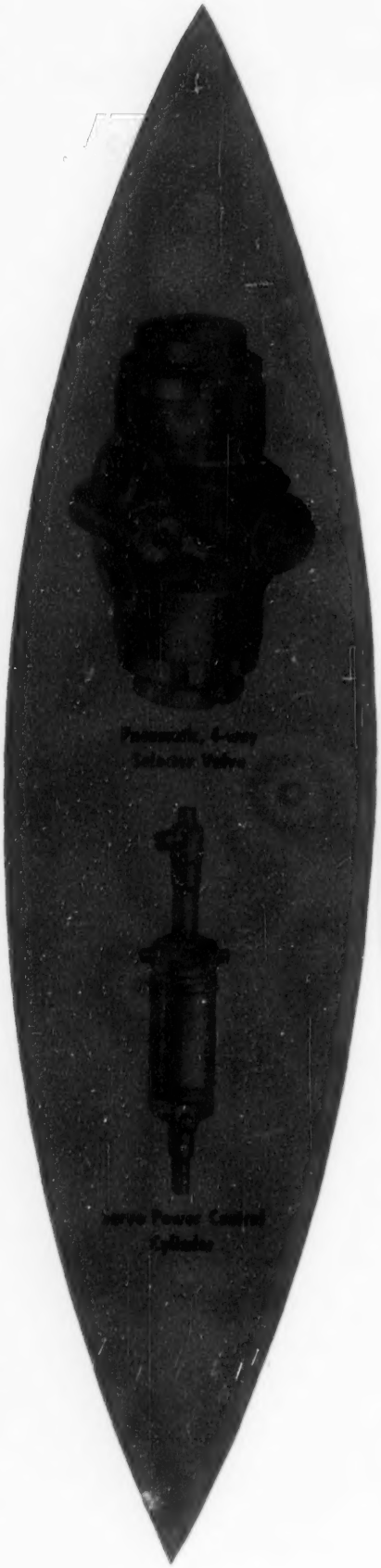
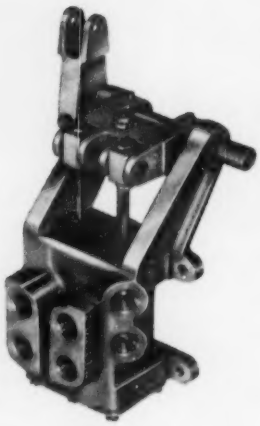


Power Brake
Control Valve



Dual Servo
Control Valve

QUALITY comes first at Weston Hydraulics Limited. Many units have more than 1,500 separate inspections, tests, and measurements of dimensions and performance before they are released for shipment. This extreme care, through every step of manufacture, is one reason Weston hydraulic units are used by more than 80% of the major airframe manufacturers.

Weston Hydraulics Limited designs and manufactures hydraulic power control cylinders, actuating cylinders, solenoid selector valves, manual selector valves, regulator valves, shut-off valves, brake valves, servo valves, pneumatic control units, and other control equipment for airplanes and guided missiles.

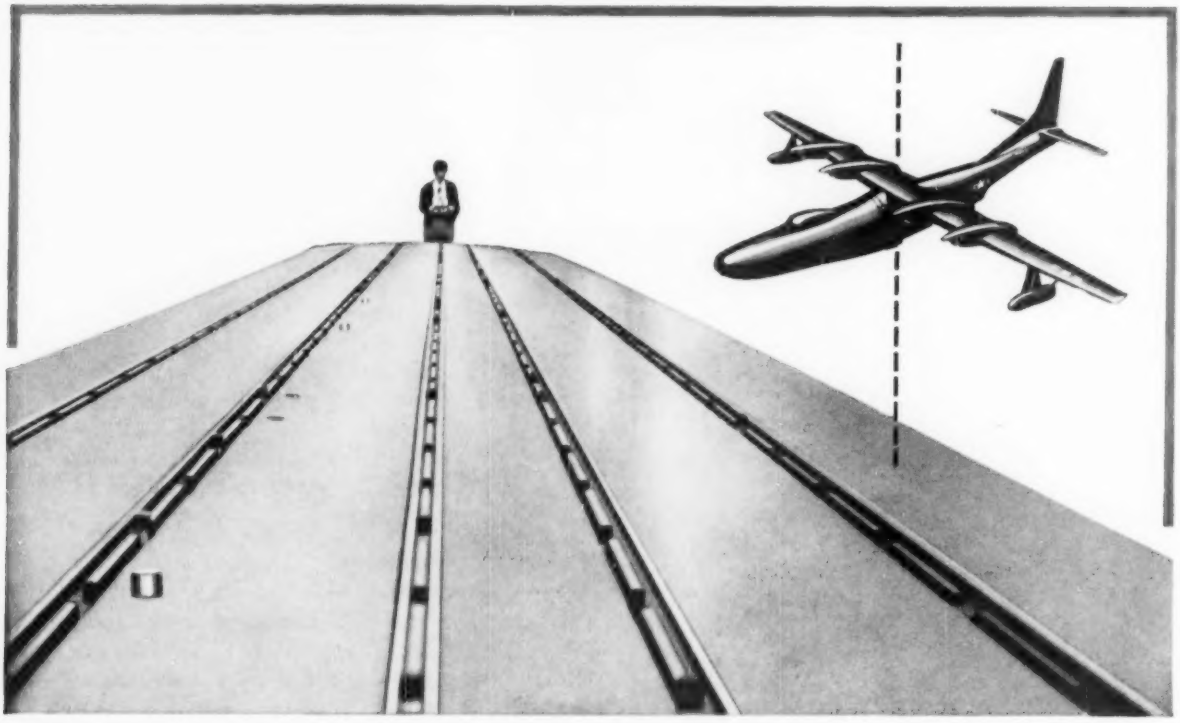
The six illustrations are representative of the types of units manufactured by Weston.

The blueprint represents a new unit soon to be in production. This is a 4-way, pilot operated, SELECTOR VALVE for directional control of hydraulic actuating cylinders. While it *is* a new unit, yet it has already been proved. Fundamentally it is a redesign of the widely used Weston Ball Pilot Selector Valve which has established an outstanding record for dependability. This new design provides equivalent performance in a smaller package and at a weight saving of approximately one-third. It uses no moving seals and so provides maximum adaptability to high temperature operation. Available in a wide variety of flow configurations. Port sizes: ¼", ⅜", ½", ⅝". Write for full information.

DOW

NAVY'S R3Y-1 FEATURES MAGNESIUM CARGO DECK

"Fastest flying boat" demonstrates extruded magnesium's combination of light weight and toughness for better flooring



MAGNESIUM EXTRUDED CARGO DECK SECTION *of the new Convair-built Navy R3Y-1 "Tradewind" now in production at San Diego. Magnesium provides the R3Y-1 with a tough, yet lightweight, easily installed cargo deck for heavy-duty service*

In all its 40-year history, water-based aircraft has never been appraised in terms of speed or maneuverability. The big lumbering transports of past years were reputedly slow and cumbersome in flight. This was true primarily because of their great weight.

Today, however, Convair and the U. S. Navy present the "Tradewind" as the fastest flying boat in aviation history. Its turbo-prop engines provide a top speed of more than 350 mph . . . enable it to take off in 30 seconds with full load.

One factor that contributes greatly to the increased speed and easy handling of this giant seaplane is the extensive use of magnesium in its design. Take as an example, the cargo deck. It's made of magnesium ZK60A extrusion alloy. It's light in weight. (Magnesium is the world's lightest structural metal!) And it's strong and rugged enough for heaviest duty. This combination of qualities makes magnesium perfectly suited for this application.

There are other instances, too, in this and in other aircraft, where magnesium has helped designers solve some of their weight and speed problems. Have you considered magnesium for your uses? For more detailed information, contact your nearest Dow sales office, or write directly to THE DOW CHEMICAL COMPANY, Magnesium Department, Midland, Michigan.

you can depend on DOW MAGNESIUM

DOW

(Continued from p. 50)

may be ganged on a single shaft and up to 17 taps per section can be provided, Helipot Corp. says. Helipot's new L series has a 3-in. diameter, continuous rotation, with standard linearity of 0.5% and special order linearities to 0.1% in resistance ranges of 10,000 to 100,000 ohms. Up to eight sections can be ganged on a single shaft and as many as 33 taps can be made in a single section, company says. The new Model L supersedes the Model F and can be substituted for it in most applications despite its smaller diameter, the firm says. Helipot Corp., South Pasadena, Calif.

• **Waters Manufacturing, Inc.** Miniature wire-wound potentiometers ⅞ in. in dia. and ⅝ in. long, weighing less than half an ounce, are available in single or ganged units in resistance ranges of 10

to 50,000 ohms. Units are rated at 3 watts and capable of operating at temperatures of −55C to 80C, according to manufacturer. Waters Manufacturing, Inc., 4 Gordon St., Waltham 54, Mass.

Analyzer Aid Traces Curve Automatically

Two automatic digital plotting devices, one of which can also be used as an automatic curve follower, have been announced recently. The plotters and their manufacturers:

Logrinc Digital Graph Follower

• **Logrinc Digital Graph Follower,** made by Logistics Research, Inc. When used as an input device, a small photo-cell will cause the device to follow a curve plotted on a chart placed on its drum, generating electric signals proportional to the "X" and "Y" ordinates of the curve. In this way curves can be introduced directly into digital differential analyzers.

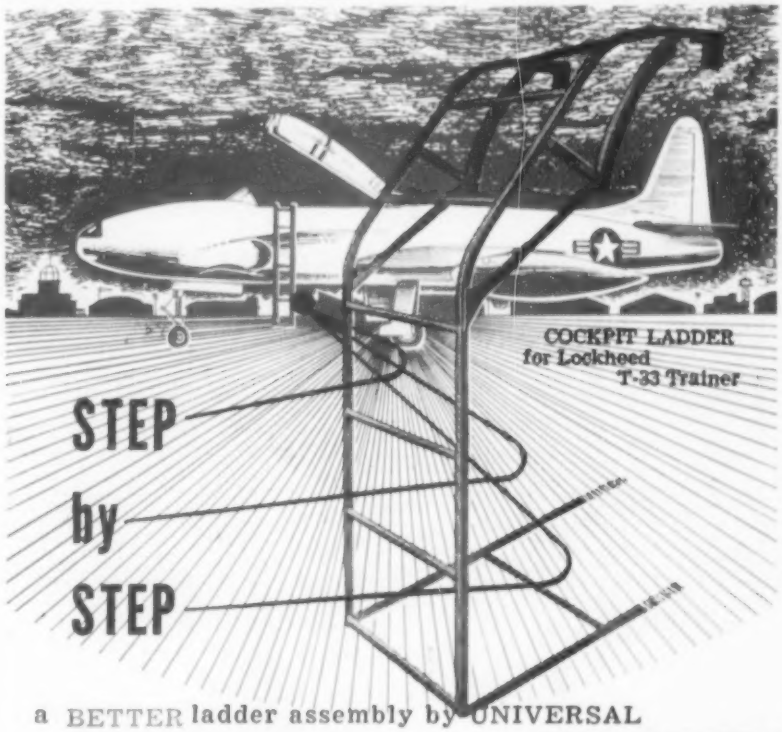
When the photo-cell is replaced with a plotting pen, the device will operate from punch-cards or punch tape to convert their data into a curve.

The device will move in increments as small as 1/100th inch at rates of 20 steps per second, manufacturer says.

Another model of the device can handle functions with two variables. Company address is 141 S. Pacific Ave., Redondo Beach, Calif.

• **Model 701 Digital Point Plotter,** made by California Computer Products, has a plotting resolution of 40 points per inch, with accuracy held to 0.025 in., manufacturer says. Device can handle charts 11x17 in. and plot up to 30 points per minute according to manufacturer.

The company's address is 3927 W. Jefferson Blvd., Los Angeles 16.



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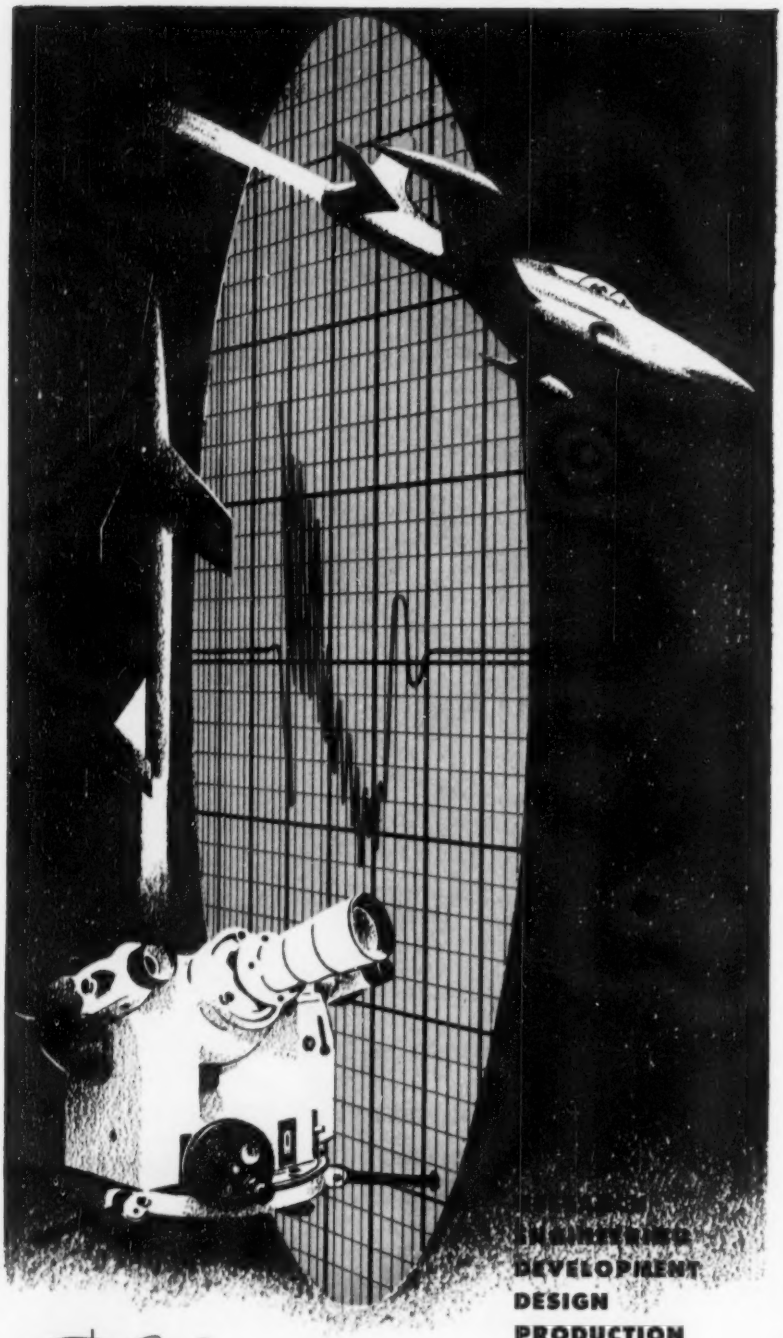

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▶ **Ford Sets Up Graduate Fellowship**—Ford Instrument Co. has set up a $4,000 annual fellowship in the name of its founder, Hannibal C. Ford, for graduate work at Cornell University in electrical or mechanical engineering, engineering physics, or mechanics and materials. The award will be given each year to a first-year graduate student for study at Cornell.

▶ **NBS Develops Sensitive Micromanometer**—The National Bureau of Standards has announced an ultra-sensitive micromanometer capable of measuring differential pressures as low as 0.03 micron of mercury (0.00003 mm. Hg) with resolutions of the order of 0.0001 micron Hg. The device consists of a thin diaphragm which operates a capacitance-type pickup in a resonant bridge carrier circuit. It has an accuracy of better than 2%, NBS says, under pressure variation rates up to 20 cps.

▶ **New Non-Linear Resistors**—Mellon Research Institute has reportedly developed non-linear resistors whose resistance varies with the seventh (7th) power of the applied voltage.

▶ **AEDC Data Reduction**—Engineering Research Associates Div. of Remington Rand is developing the data reduction computers to be used at Arnold Engineering Development Center at Tullahoma, Tenn. (AVIATION WEEK, June 15, p.36), a company spokesman says. The ERA devices will record and tran-

LIGHTPLANE TRANSMITTER

New Lear 12-channel, two watt, crystal-controlled VHF transmitter weighs little more than half a pound and is designed for service as a basic or standby transmitter for lightplanes. New RT-10 has a 4-mc. bandspread, uses plug-in crystals, and operates from 12 or 24-v. d.c. Device has no modulator or power supply but these functions can be supplied by Lear ADF-12 automatic direction finder. Learcal Division, Lear, Inc., 11916 West Pico Blvd., Los Angeles 64, Calif.

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for the REPUBLIC THUNDERJET

Flying at near sonic speed on a long-range ground support or bombing mission, the F-84 Thunderjet pilot needs a break, and gets it—welcome relief provided by his Lear Autopilot.

On the straight-away flight he can sit relaxed, conserving his energies for procedures requiring human decision. He changes course simply by "dialing" the kind and degree of change required on one of three knobs on his autopilot controller, or permits his Lear Autopilot to take over completely on the straight and level course. To a Lear Servo Unit, his Lear Autopilot transmits a signal—and smoothly, automatically, his craft takes on the desired attitude of flight.

Lear precision-engineered Control and Actuating systems and components, used extensively in military aircraft of all types, and in aircraft operated by major airlines, are aiding in the development of smoother, more economical and safer flight.

LEAR AUTOPILOT SYSTEMS— compact, light weight, automatically perform any normal flight maneuver. Used in commercial and military single, multiple-engine and jet aircraft.

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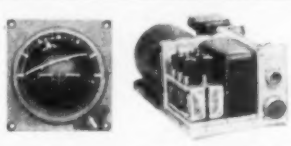

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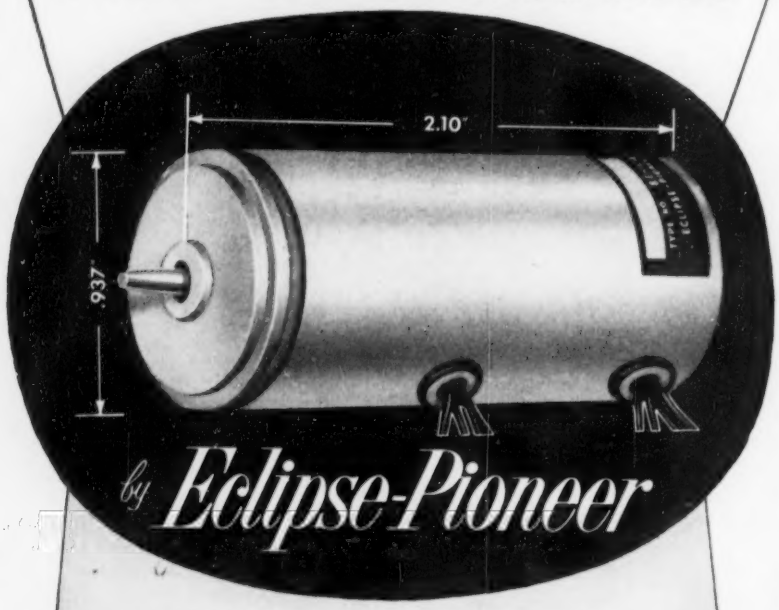

by Eclipse-Pioneer

TYPICAL ELECTRICAL CHARACTERISTICS

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Linearity—½ of 1% to 4000 rpm
Output—300 mv/1000 rpm with 18 volt, 400 cycle excitation
Null—10 mv or less

MOTOR DATA

18 or 26 volt, 400 cycle, 2-phase low inertia motor

As one of the world's oldest and largest producers of synchro-type equipment, we are ideally qualified to provide you with the right answer to your motor generator needs. Why not take advantage of our long, practical experience? Call on us for recommendations based on handling your individual problem most efficiently.

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scribe the multitude of windtunnel and jet engine test data.

► **CRT Display for Navigation**—The Communication & Navigation lab, at Wright Air Development Center, is currently investigating the possible use of a cathode ray tube type of cockpit indicator to display all navigation information.

► **Hughes Expands Diode Facilities**—Hughes Aircraft Co.'s Semi-Conductor Dept. has announced that its sub-miniature glass-encapsulated germanium diodes are now available in production quantities as a result of expanded manufacturing facilities. The diodes are available in 17 RTMA types, including three JAN-approved types.

► **New Flush ADF Antenna**—A new flush-mounted loop antenna for ADF and radio compasses has been announced by Bendix Radio Div. of Bendix Aviation. The new antenna reportedly has a sensitivity equal to or greater than the present Bendix MN-60 and MN-36 loops and weighs only half as much. Flush design is made possible by the use of four ferrite bars, mounted 90 deg. apart, which concentrate RF energy in the small pick-up loop. Bendix says the new flush-mounted antenna will be available commercially next spring.

► **New Premium Tube**—Radio Corp. of America has announced a new premium tube, the 6101, a ruggedized version of the 6J6, medium-mu twin triode. Among the improved construction techniques used in the 6101, RCA lists: a pure tungsten heater for long life, added top and bottom mica insulators to anchor tube elements more firmly, and additional insulating material to prevent heater-to-cathode short circuits.

—PK

HIGH-TEMPERATURE SWITCH

Designed for use in jet engines, gas turbines and afterburners or wherever high-heat warning is required, this thermal switch maintains set calibration for 100 hr. at 1,500F with only 10F variation. Made of stainless steel by Control Products, Inc., Sussex St., Harrison, N. J., the switch weighs 6 oz. and withstands high vibration, according to its manufacturer.

GULF SALUTES AVIATION'S GOLDEN ANNIVERSARY

FIRST FLIGHT...
KITTY HAWK, N. C., DEC. 17, 1903—
Orville and Wilbur Wright accomplished the
first successful flight of a self-propelled flying
machine, today, at Kitty Hawk. A machine
driven by a pair of propellers which were
by a gasoline motor rose from
carrying a pilot, and flew

FIFTY YEARS ago, in 1903, for the first time in history, a powered, controllable, heavier-than-air machine capable of carrying a man was flown. It carried, one at a time, two young Americans, Orville and Wilbur Wright. This year, 1953, twenty-eight million Americans, young and old, will be passengers on U.S. domestic airlines. Millions of others will fly the international airline routes and in executive and private planes. Gulf has been actively associated with this phenomenal progress as a supplier of aviation products to individual and corporation plane operators, and to the airlines whose insignia appear on this page.

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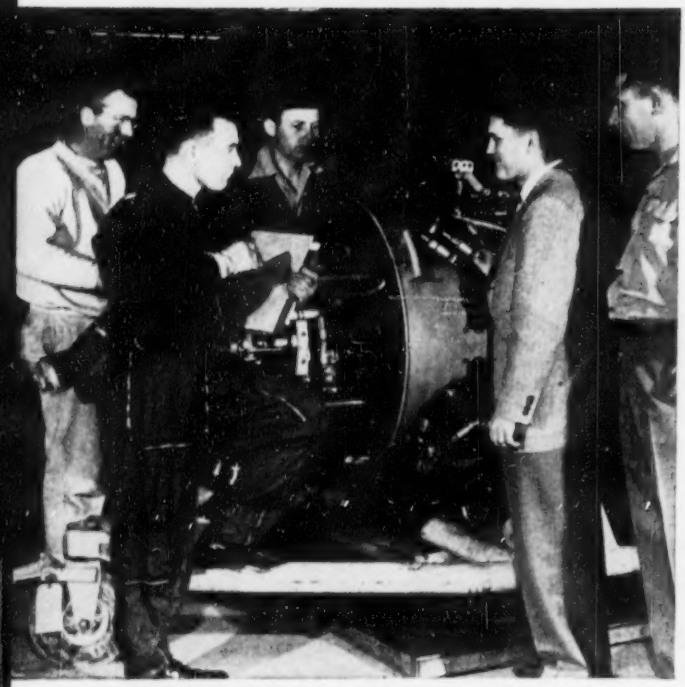
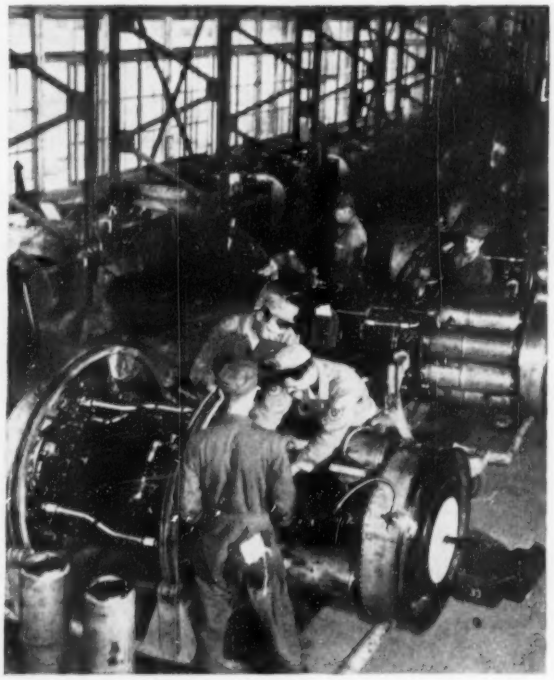
AVIATION PRODUCTS

HOME BASE OF G.E.'S far-flung jet service organization is at General Electric's Evendale, Ohio, plant. Tech reps at 65 key operational centers comprise a service network that brings G-E engineering within easy reach of G-E jet engine users.

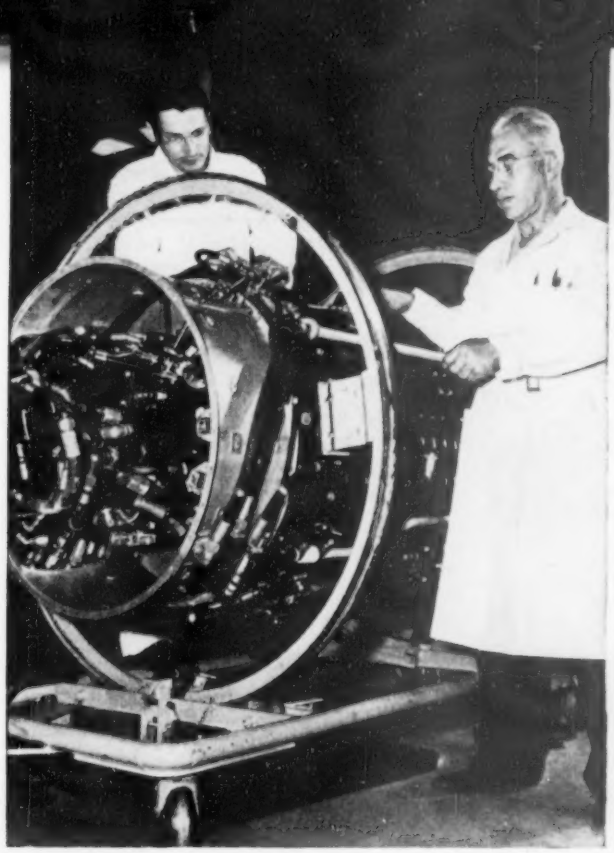
How General Electric maintains peak turbojet



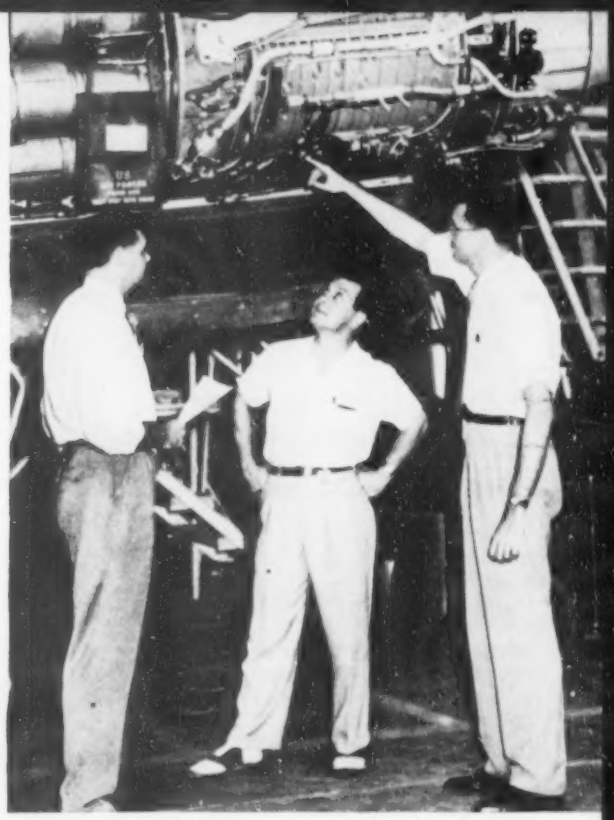
USAF REPRESENTATIVES co-ordinate with G-E technical representatives in seeking new ways to improve performance of G-E turbojets.



USAF OVERHAUL BASES receive special engineering assistance from G-E district personnel. Each district covers selected areas in U.S.



G-E SERVICE SHOPS at Los Angeles and Strother Field, Kansas, modify G-E jet engines coming from points in the United States.



AIRFRAME MANUFACTURER'S personnel are instructed by G-E tech reps on maintenance and operation of G-E jet engines.

performance in the U. S.

Coast-to-coast Service Brings G-E Jet Engineering Into Field At 65 Key Locations

Highly trained G-E "trouble-shooters" provide engineering assistance at USAF bases, airframe manufacturers' plants, USAF overhaul bases, G-E service shops, and special experimental test locations. Not only do these technical representatives assist in the solution of engineering problems in the field, they do much to improve jet engines still in the factory.

Coast-to-coast and throughout the entire world, G-E jet engines are assured peak performance at all times. In Korea, England, Germany, Puerto Rico, Alaska, as well as the United States, G.E.'s jet service engineering organization is on the spot to make sure G-E turbojets are performing properly. In the United States alone, 65 key locations are brought within easy reach of G-E engineering by a nation-wide service network.

In addition to instructing USAF and airframe manufacturers' personnel on maintenance and parts ordering, tech reps submit engineering reports on in-service jet engines to factory engineers. These reports are carefully studied by development engineers and often result in design changes. Many of the more than 3,000 improvements in the J47 can be attributed to observations of G-E technical representatives in the field.

Following through on jet engines after they have left the plant means that no matter where a G-E jet engine goes, General Electric engineering goes with it. This is added assurance to users of G-E turbojets of optimum performance throughout the life of the engine. 230-12

SPECIAL TEST LOCATIONS provide means for G-E tech reps to record engine performance under severe conditions.

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GENERAL ELECTRIC

CPA's Varied Air Fleet Covers Canada

- **Carrier's 35 aircraft include eight types.**
- **Engineering department stresses maintenance.**

By George L. Christian

Vancouver, B. C.—Starting with the premise that the aircraft manufacturers know what they are doing, Canadian Pacific Airlines' engineering department dedicates the major part of its effort to solving the service needs of the carrier's various departments.

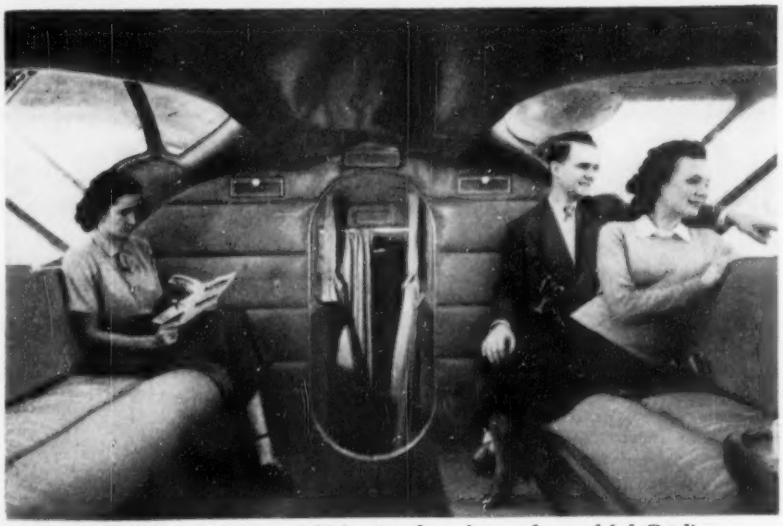
An airline official estimates that CPA engineers give 80% of their attention to the maintenance department, 10% to operations and the remainder to manufacturers. He says: "We engineers treat ourselves as an extension of the manufacturer's service department . . . we do not write any specs, rather we take the manufacturer's specs on which we superimpose our own particular requirements. This all adds up to the aircraft we need for our airline.

"We make every effort to work with the manufacturer. Occasionally, of course, we have to design or modify a piece of equipment to meet our own operations. Plane makers have the experience, facilities and money to design and develop practical, sound equipment. Our philosophy is to let them do the designing, not us." He conceded that this philosophy may have to change as CPA grows bigger.

► **Light on Maintenance**—Canadian Pacific engineers are pleased with the Douglas DC-6B. Four -Bs fly the carrier's international routes from Vancouver to Tokyo and Hong Kong on one segment and Honolulu, Fiji, Auckland and Sidney on another. Engineers say the airframe is easy to maintain and has few engineering problems. They expect the same efficiency out of the aircraft when CPA extends to Lima, Sao Paulo and Rio de Janeiro this fall.

CPA has been having equipment problems. One entailed the DC-6B's Goodrich brakes. Some 80% of the originally installed brake blocks had to be removed in the first 400 hr. of operation because of breakage. Fix was to replace original blocks with newly designed units which have more material on the block's ear and a more generous radius in the block's cut-out arrangement. The new blocks appear to have solved the breakage problem, according to CPA.

FOUR DOUGLAS DC-6Bs carry CPA's international passengers to the Orient.



PLUSH INTERIOR is feature of Visionaire, dressed-up and remodeled Catalina.

Another worry was high failure rate of the brake's expansion tube shield When the shield fails, the expansion tube pushes up between blocks and gets pinched, requiring frequent replacement. Otherwise, the brake gives excellent service.

The airline is currently modifying the DC-6B's P&WA R2800 engines from the 2,400-hp 83AM3 model to the 2,500-hp CB17 version, allowing a gross takeoff weight increase from 102,600 lb. to 107,000 lb. This will be a big help on the Vancouver-Honolulu hop, which can be critical at the lower takeoff weight if stiff headwinds are encountered.

Canadian Pacific had its DC-6Bs wired by Douglas to accept the Scintilla portable-airborne ignition analyzer installed on the planes.

The carrier's engineers say that they and the flight crews are proponents of throttle reverse guards. A guard of this type consists of a spring-loaded plate fitted to the pedestal behind the throttles and mechanically blocking any attempt by the pilot to pull throttles back into reverse position. Procedure is for the co-pilot to lift the guard plate out of the way as soon as the plane touches the ground, allowing the captain to reverse props at will. Guard automatically flops back in place as soon as throttles are advanced. This admittedly imposes an additional duty on the co-

pilot during landing. But the carrier points significantly to the fact that it has not experienced a single instance of inadvertent prop reversal since delivery of its DC-6Bs. Units are light, cheap and easy to manufacture and install.

► **Three-Prong Airline**—Canadian Pacific Airlines operates three separate domestic route structures.

Largest domestic segment is the Western line, knitting together the large Canadian provinces of British Columbia, Alberta, and Saskatchewan with Yukon and Northwest Territories and Alaska. Middle segment is in Manitoba where CPA DC-3s link Churchill, on Hudson Bay, to Winnipeg via Flin Flon, The Pas and Dauphin. Eastern segment, in the provinces of Ontario and Quebec, connects Toronto to Seven Islands and also shoots off to the Northwest to Rouyn/Noranda and Val d'Or.

Aircraft used on the two easternmost segments have to be deadheaded from CPA's overhaul base to the route when planes are returned to scheduled flight duty. They also deadhead to Vancouver when ready for overhaul. Since the DC-3s come in for major overhaul at 10,000-hr. intervals and average 3,000 hr.-plus a year, they may stay out for 3-3½ years.

CPA operates a large variety of aircraft. Its fleet consists of: two Norsemen Vs, two Anson Vs, a Canso A Visionaire (Canadian-built PBY Catalina with large observation windows replacing the side gun emplacements), 15 DC-3s, five 240s, four DC-4s, and four DC-6Bs. Two DC-6As, scheduled to go into service soon, will bring the airline's total fleet up to 35 aircraft.

► **Home-Made Collimator**—Example of how the engineering department helps out the maintenance department is the novel and highly accurate periscopic sextant collimator seen in the carrier's shops.

Device consists of a sextant mount rigidly attached to a vertical steel mast, forming a right angle. On the mast are clips which hold ¼-in. dia. steel balls along the mast. Balls are placed at 0, 10, 20, 30, 40, 50, 60, 70, and 75 deg. angles measured from the sextant mount. It is also possible to measure up to 90 deg. Ball spacing on the mast is accurate to one diagonal ten-thousandth of an inch.

When a sextant is being collimated, bright lights are focused on the steel balls which reflect small pinpoints of light, duplicating stars. The ball-reflected light works out much better than miniature lights strung along the mast, initially tried.

The stand is levelled with a mercury level and a plumb bob.

CPA maintenance people say that

ELECTRICALLY TRANSMITTED instruments are tested in Vancouver shop.

COMPASS UNIT is checked out in screen room of Canadian Pacific's radio shop.

PROPELLER OVERHAUL SHOP technicians inspect a three-bladed prop.

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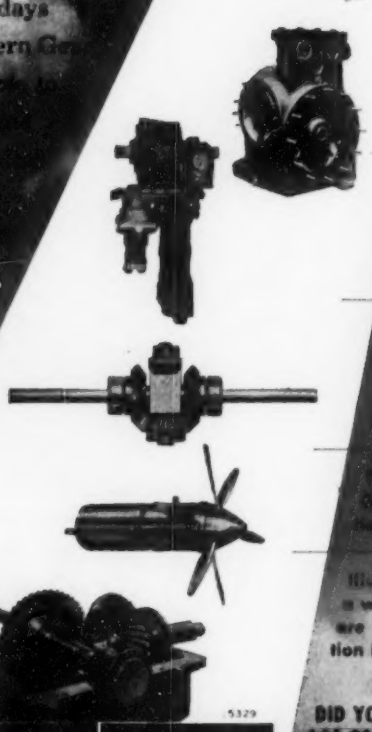

Auxiliary Power Unit . . . Illustrated is a Western Gear designed and built gear drive for use with gas turbine auxiliary power unit in aircraft.

Actuators . . . Illustrated is a special dual power actuator using both hydraulic and electric power. Thousands of different types of gear driven actuators have come from Western Gear drawing boards.

Electronics . . . Electronics in Aviation . . . electronic equipment manufacturers use Western Gears for many kinds of airborne equipment. Fine pitch differential shown was used on electronic equipment for a ground guided missile.

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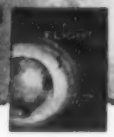

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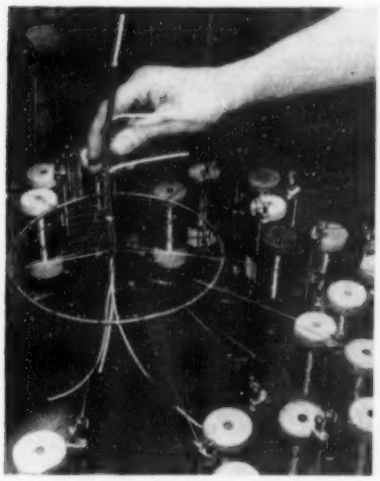
navigators using sextants collimated on their stand report the instruments to be extremely accurate. The stand cost only $300-400 instead of the several thousand dollar price of a commercial model. The commercial units admittedly are more elaborate than the homemade stand, but theirs does the job required of it accurately and cheaply, they say.

▶ **Instrument Shipping Containers**—Most airlines have devised some way to ship unserviceable aircraft instruments from the field to overhaul depots and return serviceable units to line stations.

The airline purchases two sizes of standard industrial cans which can be had cheaply in unlimited quantities. The cans are lined with thick layers of rubberized horse-hair giving instruments excellent shock protection. One-gallon cans are used to ship small instruments such as airspeed indicators, rate-of-climb and turn-and-bank units, altimeters and compass indicators. Four-gallon cans are used for gyro instruments such as artificial horizons and directional gyros.

A large window is cut in the top of the instrument shipping cans and the windows are covered with Plexiglas. Windows serve a dual purpose. First, the serviceability tag in the can may be read without opening the can. Tag must be consulted to determine



HARNESS BRAIDER

With this braiding machine, Northwest Orient Airlines expects to save $10,000 a year. Airline uses the machine to rebraid R4360 low-tension Scintilla ignition harnesses at a fraction of what it used to cost when NWA sent them to the factory. Price was $75 per harness; total yearly cost was $15,000. Machine purchased from New England Butt Co. for $1,064, including bobbins, will pay for itself in one month, NWA officials say. They expect it will also have applications in electrical and radio overhaul work.

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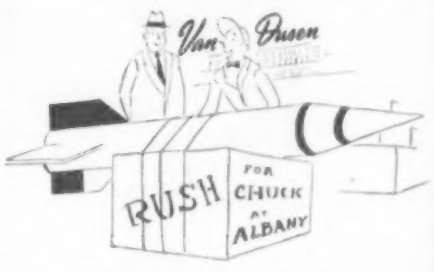

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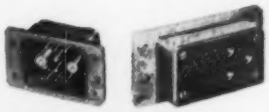
AN Designed to Air Force–Bureau of Aeronautics – requirements. Now widely used for all instruments requiring electrical circuits. Coupling nut connection and disconnection. Two plug types; 3 receptacles with variations and clamp accessories, in 15 shell sizes and more than 250 insert arrangements. A type for every need. Ask for "AN" Bulletin.

K & RK Designed for uses in aircraft, this versatile lightweight plug is widely used on a great variety of instruments and electronic equipment. Special acme coupling nut connection and disconnection. 8 contact sizes accommodate 16, 14, 10, 8, 6, 4, 2 and 0 AWG. Maximum 200a. 8 shell diameters. 204 insert variations. KH Series, hermetically sealed Type K, also available. Write for "K" Bulletin.

GS (AN) Designed for applications demanding hermetic sealing under high pressures in a temperature range from minus 300F to plus 600F. 2 basic shell designs. NEF threaded coupling nut. Steel shells and steel contacts. Mate with AN Series. See "AN" Bulletin or "GS" Bulletin.

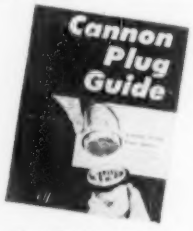
XL For audio equipment and general electronic uses: 3 and 4 contact layouts, 10 and 15a; 17 shell designs; zinc and steel plug shells. Ask for "XL" Bulletin.



DPB-DPD For rack-and-panel installations, instrument panels and for any plug-in sub-assembly where both halves of the connector are rigidly mounted, or where one half is rigidly mounted and the other half cord mounted. 78 max. contacts, 200a maximum. Ask for "DP" Bulletin.

D SERIES SUB-MINIATURE PLUGS
Designed to meet the miniaturization program. Used both as rack-and-panel disconnect and cord connectors for hand portable radio equipment, audio circuitry and related applications. Keystone shaped. 15 to 50 gold-plated contacts. DH hermetically sealed also available. See "D" Bulletin.

U SERIES SUB-MINIATURE PLUGS
For hermetically sealed instruments, indicators, miniature switches, relays, transformers, amplifiers and other miniaturized sealed components. Steel shells & pin contacts; standard socket contacts in Silcan insulators. 1, 3, 6, 12 contact arrangements. 5a max. Bayonet lock coupling. See "U" Bulletin.



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whether instrument is serviceable or not and to find out what type of instrument is in the can. A secondary advantage is that personnel instinctively handle the windowed cans with greater care than when cans were windowless. The current low damage rate is very satisfactory, say the airline's instrument people.

▶ **Grease Dispenser**—Accessory overhaul mechanics devised a grease dispenser from four discarded engine cylinders mounted side-by-side on a rack. Tops and bottoms of the cylinders were plugged with pieces cut from junked pistons. Airtight seal is assured by placing O-rings between pistons and cylinder. A third sawed-off piston floats on top of the grease below the top piston. Shop air pressure is piped to the dispenser between top and floating pistons forcing the latter down. Grease squirts out of four spigots at the bottom of the cylinders.

Advantage of this home-made gadget is that different greases are kept segregated and clean. And ease and speed of dispensing ended the time-honored custom of mechanics keeping small quantities of grease in paper cups on their work benches.

Four types of grease kept in the dispenser are: ANG-15A, ANG-5A and Molykote, Credag 32 and Calol BRB. 340.

▶ **Around the Shop**—To avoid unnecessary walking around by shop personnel in quest of parts, an intercom system connects each overhaul shop to central stores. Runners periodically take parts where needed.

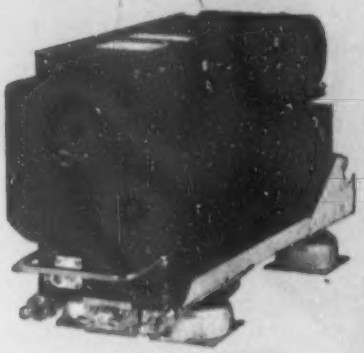
To avoid using the wrong gasket, large boards are fastened on the walls of overhaul shops. Each type of gasket is hung on a separate nail. Beneath the nails are the full nomenclature and part-number of the gasket. Gasket mistakes have dropped almost to the vanishing point, according to CPA.

▶ **Empress Tradition**—Canadian Pacific Airlines inherited an "Empress" tradition from its parent company, Canadian Pacific Railroads, which named its fleet of steamships "Empress of" followed by the name of a country. DC-6Bs are also named "Empress of."

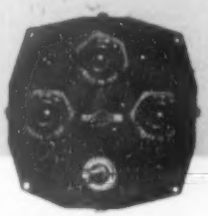
The Empress tradition connotes luxurious, gracious travel. So CPA took delivery of its DC-6Bs without berths. Instead, seats were generously spaced with 54-in. centers giving a seating capacity of 42 in the main cabin plus eight seats in the forward compartment. With such spacing, even tall passengers can stretch out. On certain routes, such as the return flight from Sydney to Vancouver, passengers deplane when the aircraft arrives in Honolulu in the afternoon, put up at a hotel at CPA expense and depart for Vancouver at eight the next morning, making berths unnecessary. The airline's chief com-

GOOD FRIENDS IN BAD WEATHER

51Z Marker Beacon Receiver



51V-2 Glide Slope Receiver



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- AC OR DC POWER SUPPLY—OPTIONAL

Collins 51Z-1 Marker Beacon Receiver

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Collins-designed 3 light indicator has standard Hi-Lo switch and push-to-test indicator lamps. The lights and switch are also available in kit form if it is desired to mount the marker indicator lights on the aircraft panel vertically, horizontally or differently than the standard triangular mounting pattern.

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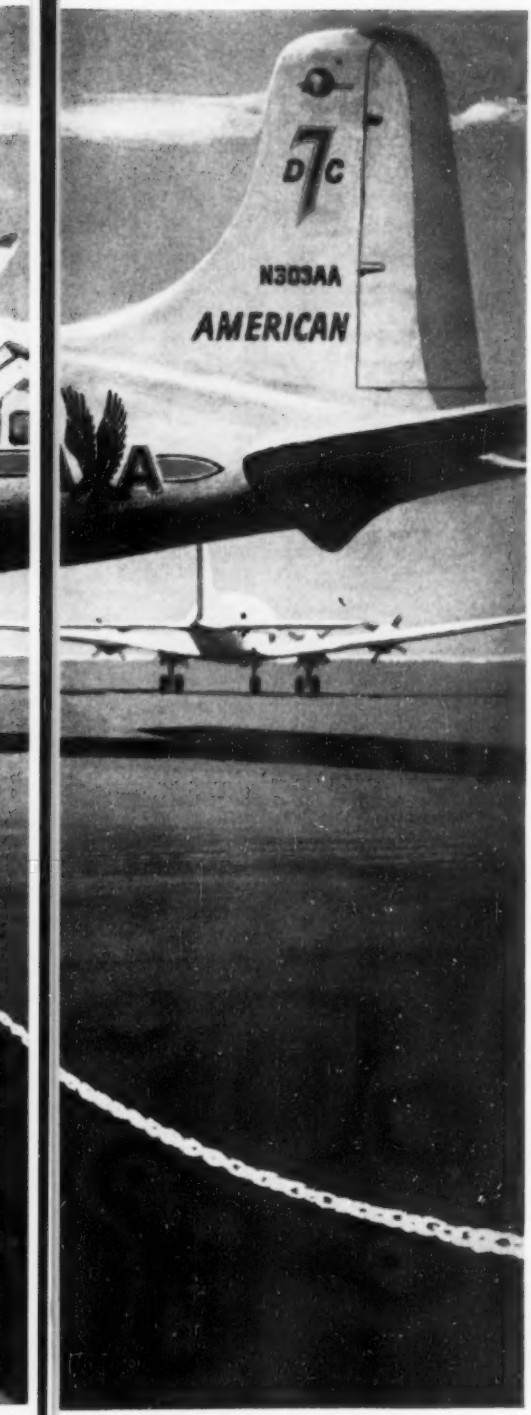

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petitor on this trans-Pacific run, British Commonwealth Pacific Airlines, in turn, says that it is "the only trans-Pacific airline providing a free sleeper to every passenger."

On the Vancouver Tokyo-Hong Kong run, the DC-6Bs have a more conventional seating arrangement—56 seats in the main cabin plus eight up front.

The lure of tourist travel is tempting CPA to convert its planes to two-class travel officials say. The forward part of the cabin ahead of the loading door would seat 40 tourist passengers in eight rows of five seats spaced on 52-in. centers. Forward compartment would retain its total of eight and the rear compartment, aft of the loading door, would seat 16 first-class passengers.

► **Compact Crew**—Pacific operations are carried out with captain, first officer and navigator. The pilots handle all of the radio work and the duties of the flight engineer. CPA spokesmen point out that all three flight crew men are qualified four-engine pilots and are therefore completely interchangeable.

Loss of the carrier's first de Havilland Comet 1A jet airliner at Karachi May 2 dealt a hard blow. Faced with the imposible task of operating a route segment from Sydney to Honolulu with only one remaining Comet 1A, the airline abandoned its jet plans for the time being and sold the jet to British Overseas Airways Corp. But the airline is expected to firm its option on four Comet IIs (AVIATION WEEK Sept. 7, p. 84), so jet operation is still a distinct possibility for Canadian Pacific.

Newark Terminal Tries Innovations

Newark, N. J.'s recently opened $8.5-million airport terminal building incorporates a number of interesting and original features designed for flexibility and smoother operations, plus some apparently aimed at local opposition, still smoldering after the three crashes in the Newark area last year.

The 576x166-ft. building is basically of hangar design—it could hold three Boeing Stratocruisers wingtip-to-wingtip. The ramp side of the structure has a 500-ft. clear span. So if circumstances required, the terminal could be converted quickly and inexpensively into a maintenance hangar or plane storage or repair facility.

Since it is cheaper to erect a hangar-type than a conventional terminal-type structure of the same floor area, the Port of New York Authority, which designed and constructed the building, got not only flexibility but a bargain, pricewise.

The building has clean lines, both inside and out, and is brightened by large window areas—the 500-ft.-long indoor observation section is said to be the longest windowed area of this type in the world.

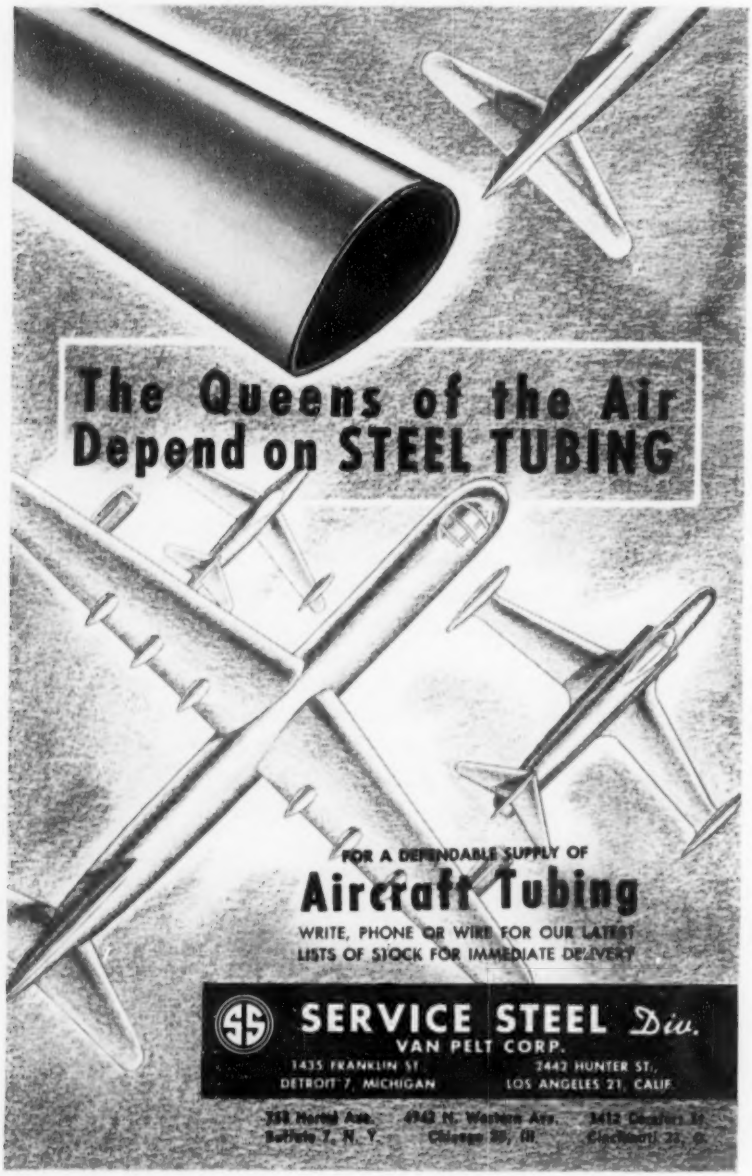
In the lobby, all airline ticketing and check-in facilities are lined up along the 500-ft. side nearest the ramp. Along the opposite side, across the 50-ft. lobby, are the gift and apparel shops, restaurants, barber shop, etc.

Two 575-ft. arcades lead from the terminal to the loading ramp. In these arcades are the crew operations rooms, where weather, weight and balance, and other pre-flight checks are accomplished. There is additional observation space atop the arcades.

Walkways from the arcades to loading ramp are raised so rainwater drains off.

The degree of continuing resentment to the Newark Airport operation may be judged from the fact that two local mayors refused to attend the opening ceremonies in late July, at which Jimmy Doolittle, Eddie Rickenbacker and Clarence Chamberlain appeared.

The Port of New York Authority has tried to integrate its operation with the community. Dining facilities at the terminal, for instance, have been designed not only for the traveling public but for the local citizenry. Private din-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Chicago 23, Illinois

ing rooms are available for conventions and meetings of local civic groups. Murals in the dining rooms illustrate high points in local New Jersey history.

From the observation areas, the public may watch the airliners operate from the new $9-million instrument runway rushed to completion after last year's series of crashes.

GE Announces New Mass Flowmeter

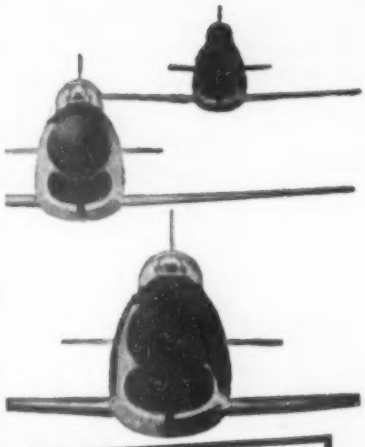
Another new mass flowmeter that measures fuel flow in pounds has just been put on the equipment shelf—this one by General Electric. The entire system weighs about 11 lb.

GE's flowmeter is made up of three components: a constant-frequency power supply, a transmitter, and an expanded scale indicator.

The transmitter, which is of unusual design, is made up of two identical cylinders, placed end to end, with a small space between. Both are contained in a leakproof housing. Upstream cylinder, which is driven by a constant-speed drive motor, contains many longitudinal, equally spaced holes around its periphery. As fuel, moving through the system, flows through the holes its angular momentum is changed. This angular momentum is removed from the fuel by the second cylinder (called the turbine), and the torque created rotates the turbine against restraining springs. Angular deflection is transmitted to the indicator where the mass rate or flow is registered in lb./hr. in the instrument's face.

Features of the unit, according to GE, are:

- **Pressure drop** in transmitter is very low, permitting it to be installed remotely from the engine.
- **Shock mounting** of all critical components makes components highly resistant to vibration.
- **Filter in system's power lines** keeps conductive and radiative radio noise within limits of MIL-I-6181.



Engineers—
PICK A WINNER

The Engineering Department which designed the **Sabre** and other headline-making military airplanes has openings for engineers—experienced in aircraft, recent engineering grads, or men from other fields with adaptable experience. Long-term military projects and twenty-five years of continuous expansion underwrite your future at North American. Current openings in:

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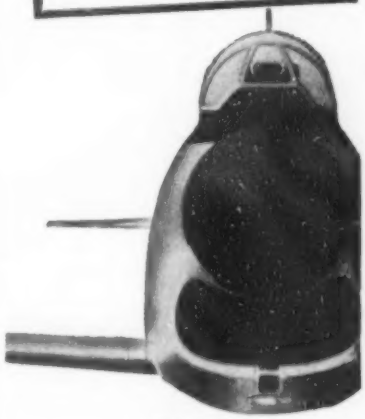

Write to

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NWA Tests Grimes Rotating Beacons

Northwest Airlines is evaluating rotating aircraft identification beacons made by Grimes Manufacturing Co. (AVIATION WEEK, Apr. 6, p. 74) for possible installation on fintips of NWA's fleet of Boeing Stratocruisers.

The Grimes unit contains a reflector, rotating at 40 rpm., which sends out two red beams—one with an arc of 20 deg., the other with an arc of 5 deg. Purpose is to identify the plane to other aircraft and to ground personnel. The 2½-lb. unit uses a 100-w. bulb. Reflector is motor-driven.

Installation time for beacons is estimated at 60 man-hours. Cost: about $350 per plane.

OFF THE LINE

New high-density track-mounted chairs for five-abreast seating are interchangeable with luxury seats at no sacrifice in strength, Hardman Tool and Engineering Co. says. The seats are stressed for 9G. They are in quantity production for KLM, Swissair and other airlines, Hardman reports, and are interchangeable among the Douglas DC-4, DC-6, DC-6B, DC-7 and the Lockheed Super Constellation. The company says these units, called the 3027 series, provide the widest aisle available with any five-abreast arrangement. Address: 1845 S. Bundy Dr., Los Angeles 25, Calif.

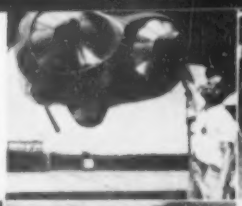
Gill batteries for civil aircraft now are shipped completely dry, with acid in separate containers. After the battery is charged at the factory the acid is removed and the battery processed to retain the charge. Because of dry shipping, the unit requires no care before being put into use and there is no need for charging, testing or addition of water. The batteries are available for all commercial aircraft, as well as most lightplanes. Made by: Gill Electric Mfg. Corp., Redlands, Calif.

Douglas DC-7 cabin windows will be triple-paned for added strength. DC-6 windows have conventional double pane.

Airline Equipment Corp., Newark Air-port, announces that it now has available Magnaflux and Zyglo inspection facilities, maintains a large inventory of Pratt & Whitney Aircraft and Wright engine spares, and components for corporate and transport airframes. Company also offers maintenance and overhaul facilities, plus a complete radio and hydraulic shop.

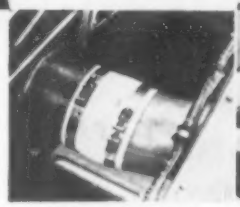
Each of the 12 vents on the B-36 are wrapped with resistance wire and Silastic R Tape to keep ice from plugging oil vent lines.

Thin layers of Silastic insulate bare resistance wire inside jet intake door panels; conduct deicing heat evenly and rapidly to panel surfaces.



More than 180 limit switches on the B-36 are protected with Silastic boots to assure reliable operation at temperatures ranging from —100° to 170°F.

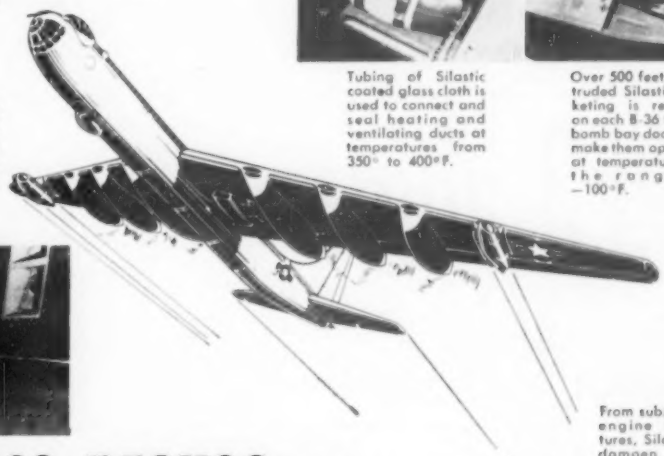
Silastic-coated glass cloth gaskets on the rockerboxes of the P & W engines give long service in contact with oil at temperatures up to 450°F.



Nose turrets are sealed with two 56-inch lengths of cloth-wrapped, sponged Silastic tubing.

Over 300 Silastic flange gaskets in each B-36 seal hot air system at temperatures as high as 400°F.

"Orlon" wrapped, sponged Silastic seals prevent air turbulence between flap and engine nacelle; last 10 times as long as materials previously used.

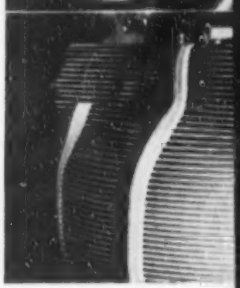


Tubing of Silastic coated glass cloth is used to connect and seal heating and ventilating ducts at temperatures from 350° to 400°F.

Over 500 feet of extruded Silastic gasketing is required on each B-36 to seal bomb bay doors and make them operable at temperatures in the range of —100°F.

Ninety feet of cloth-wrapped, sponged Silastic is used to prevent turbulence and short circuiting of air between leading edge of the flaps and trailing edges of the wings.

From subzero to hot engine temperatures, Silastic strips dampen vibration and prevent breakage of cooling fins on aircraft engine cylinders.



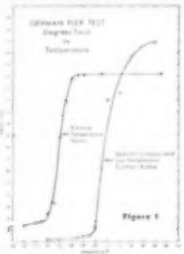
Performance proves...

SILASTIC* works

where other materials fail!

Extreme temperature Silastic stocks are the only rubbery materials that retain their resilience after long exposure to temperatures from —100° to 350°F or after repeated short term exposure to temperatures from —130° to over 500°F. That's why Silastic parts have proved so effective in actual service on the high flying Convair B-36.

The usefulness of rubberlike materials at extremely low temperatures can be established by the recently developed Gehman Flex Test Method (ASTM D1053-52T). Values measured according to this method on an extreme temperature Silastic and a synthetic organic rubber especially compounded for a low temperature service are plotted in Figure 1.



You will note that Silastic does not begin to stiffen until it reaches —50°F, and that it still has a twist value of 13.5 degrees at —130°F. The special low temperature organic rubber loses resilience at +50°F, and will take a twist of only 12 degrees at —22°F.

The usefulness of Silastic on the B-36 is increased by its excellent resistance to oxidation, weathering and to a variety of hot oils. In electrical applications, Silastic stocks are unique even among silicone rubbers for low water absorption and excellent dielectric properties, plus high physical strength.

That kind of performance is typical of Silastic, the Dow Corning silicone rubber. When you need flexibility or good dielectric properties in a resilient material that will withstand years of weathering or long exposure to temperatures far above and below the limits of ordinary rubbers, specify Silastic.

*T. M. REG. U. S. PAT. OFF.

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first in silicones

DOW CORNING CORPORATION
Midland, Michigan

These and other B-36 applications for Silastic are more fully described in the March 30, 1953 issue of Aviation Week.

In Canada: Fiberglas Canada Ltd., Toronto In Great Britain: Midland Silicones Ltd., London

MAIL COUPON TODAY FOR DATA ON THE PROPERTIES OF SILASTIC.

DOW CORNING CORPORATION, Dept. D-9, Midland, Michigan

Please send me:

- ☐ Silastic Facts 10a, properties and applications of Silastic stocks and pastes.
- ☐ List of Silastic Fabricators.
- ☐ "What's A Silicone?", new 32-page booklet on silicone products and applications.

Name _____ Title _____

Company _____

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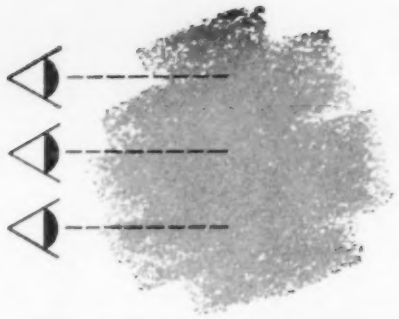
City _____ Zone _____ State _____

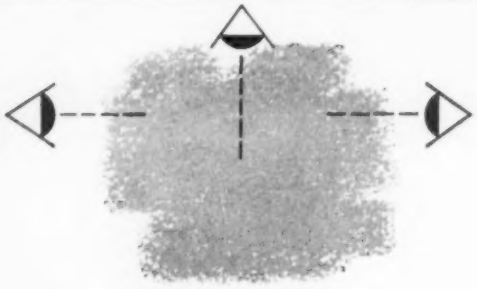
3-way analysis....

EXAMINATION
DIAGNOSIS
PRESCRIPTION



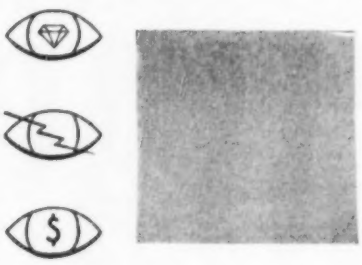
from 3 angles..

EFFICIENCY
SUITABILITY
COST



to gain 3 benefits.....

QUALITY
OUTPUT
ECONOMY



when you use Republic 3-Dimension Metallurgical Service

Fuzzy production problems shape up nice and square when the Republic Field Metallurgist and the Republic Mill Metallurgist and the Republic Laboratory Metallurgist all put to work their combined knowledge of alloy steels and heat-treatment and machining. Scores of Republic customers are making better products at greater rates and lower cost because they called in a Republic Field Metallurgist. It may be an idea *you* could use to your benefit!

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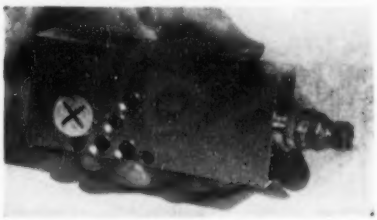
NEW AVIATION PRODUCTS



Hydraulic Servo Valve Has Self-Clearing Feature

A new hydraulic servo valve with internal mechanical feedback for the transformation of low-level electrical information into controlled hydraulic energy has been designed by Sanders Assoc., Inc.

The unit—a 2-stage 4-way design—provides a power amplification of 5,000 with pressures up to 3,000 psi. It can be completely sealed against magnetic particles and can be operated without oil filters, according to Sanders. The valve exerts a "clearing force" of up to 500 psi. in the first stage of operation to remove sludge, dirt or metal particles that might jam it.

Frequency response of the unit is flat from 0 to 150 cps., the company claims. It has a linear output up to 14 hp. with no external leakage and zero signal leakage of only 60 cc./min. Input power is less than 2 watts, input current 15 ma., resolution 0.03%, and time constant 0.001 sec. The valve weighs less than 1¾ lb. and is rated for a flow of 12 gpm.

Sanders Associates, Inc., Nashua, New Hampshire.

You Can Carry Around New Air-Ground Communicator

Aircraft Radio Corp. has come up with a portable VHF air-ground communicator which is readily hand-carried and can be set up in minutes.

Called the Type 12 portable communicator, the unit consists of the standard ARC-R-19 VHF receiver, with a choice of either the T-11B or T-13A VHF transmitters.

Controls, cables, microphones, headset, loudspeaker and antenna are included in a carrying case which is readily portable. Weight of the entire unit, including case, is 36.7 lb. Case dimensions are 18¼ in. x 8½ in. x 8 5/16 in. Distance range is 50 to 100 miles with aircraft at 3,000 to 10,000 ft. and ground antenna at 30 ft.

Receiver has a "whistle thru" feature which reportedly permits instant tuning to frequency of transmitter crystal selected by pushing "whistle thru" button while tuning receiver.

Microphone is single-button, carbon type. Headset is type ANBH-1, 600 ohms, speaker 5-in. PM. Antenna is vertical dipole, sectionized.

Input power for receiving is 3 amp., 24-28 v. d.c. For transmitting it is 4 amp., 24-28 v. d.c.

Aircraft Radio Corp., Boonton, N. J.

Glass-Wrapped Stainless Clamps Good at 1,200F

Stainless steel clamps for use in high-temperature locations in jet engine installations are being marketed by Thomas Associates.

Wrapped with spun glass cushioning material, they resist temperatures up to 1,200F. After application of the spun glass, they are dipped in a special aluminum and silicate base paint for a binder.

In 70-hr. tests at 1,200F, little change was noted except a slight flaking of the paint, Thomas reports. The fireproof clamps are available in sizes from ½- to 6-in. diameter, in increments of ⅛ in., in single and multiple tube types.

Thomas Associates, 4607 Alger St., Los Angeles 39.

Refueling Coupling Offers Lightness, Reliability

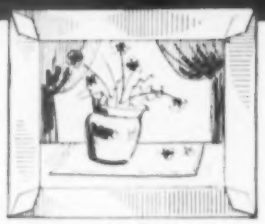
A new coupling for refueling systems, reportedly affording greater reliability, fewer leaks and an 80% weight reduction, is now being installed in late model jet aircraft.

Developed by Lockheed Aircraft Corp., the unit calls for a smaller aperture in the plane's structure than previous types. Tightening is easier.

The coupling is a flexible type allowing 4-deg. of bend in flight and is proofed against pressures three times normal, according to Lockheed.

The company further claims that the

Two Pictures . . . ONE IS ART



Oster

Thousands of paintings have been put on canvas, but only the select few have the lasting quality of great art.

We're not artists, but we do know something about quality. Osters have produced top-notch products for over a quarter of a century. We have a group of well-trained, conscientious engineers who will design and produce what you want in

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You'll find we're as precise as the old masters about the quality of our product.

You Can Depend on SAFER Flight . . . EXTRA Fight with OSTER Products

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AVIATION DIVISION
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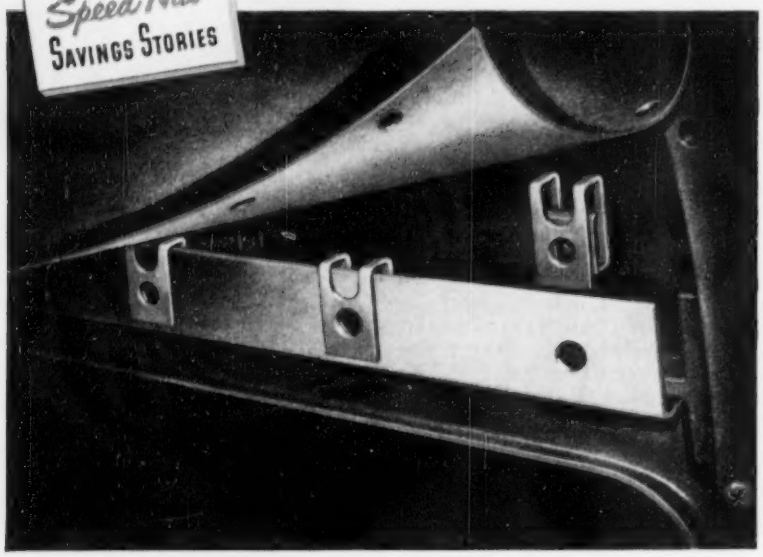
Speed Nut SAVINGS STORIES

FASTEST THING IN aircraft FASTENINGS



CONVAIR saves 448 man hours per plane... on one SPEED NUT fastening operation!

Tremendous savings like these by Consolidated Vultee Aircraft Corporation's San Diego Division may be hard to imagine, but . . . they can be made! Convair Engineering and Production experts are making this amazing economy on *one* SPEED NUT fastening operation . . . the installation of cargo liners in the new Convair 340 passenger transport! Also, the same operation yielded a sensational 80% reduction in production time, plus a 40% cut in materials and handling. Completing the story . . . the use of this U-Type SPEED NUT has eliminated an entire assembly section, releasing several trained aircraft workers to other production jobs!

Considered in terms of industry-wide aircraft production . . . savings and production boosts like these can mean millions of dollars. For similar solutions to fastening problems you may have, see the Tinnerman representative in your area!

U-TYPE SPEED NUTS

SPEED NUT WAY: A U-Type SPEED NUT and a No. 10 sheet metal screw are all it takes per hole application.

OLD WAY: Required: 2 each, Plate Nuts, Screws, Washers; 4 rivets; 1 angle trim; 1 doubler strip, per hole application.

Comparing the above methods, it's easy to see how the 450 hole applications required per airplane amount to tremendous savings.

Send today for your copy of SPEED NUT "Savings Stories"; write: TINNERMAN PRODUCTS, INC., Dept. 12- Box 6688, Cleveland 1, Ohio. *In Canada:* Dominion Fasteners Ltd., Hamilton, Ontario. *In Great Britain:* Simmonds Aerocessories, Ltd., Treforest, Wales. *In France:* Aerocessoires Simmonds, S. A., 7 rue Henri Barbusse, Levallois (Seine).

TINNERMAN Speed Nuts®

More than 8000 shapes and sizes

new sleeve-and-O-ring fitting "won't shrink, swell or shiver free under pressure."

It is designed to overcome shortcoming of former couplings which reacted to fuel by contracting or expanding and deteriorating to the point of causing dangerous leaks, Lockheed engineers say.

The unit is available in a wide range of sizes, fitting tubing of 1- to 4-in. diameter. Lockheed says it is applicable to almost any gas or liquid system.

Lockheed Aircraft Corp., Burbank, Calif.

Grinder Features Fixed Table, Knee-Pad Control

A tilt-head grinder has been developed which should have wide application in the aircraft industry.

Sierra Machinery Co., the manufacturer, claims two outstanding features for its product. First, a table which stays horizontal, while the grinder tilts to 30-deg. open or 30-deg. closed grinding position. Tilt angle of the grinding belt can be changed during operation by means of knee-pad controls.

The knee-pad control enables operator to change angle of tilt open or closed and still maintain safe and efficient handling of material being ground, according to Sierra. In addition to continuous change of tilt, the machine has an auto-stop device which permits change of tilt in graduations of ½ deg. for each press of knee-pad control.

Second outstanding feature claimed for the grinder is a refrigerated surface plate which keeps the material cool while grinding. Plate covers an area of 210 sq. in.

The unit is gear driven and compact, having a height of 36 or 37 in., a 34-in. width and a 72-in. length. A 5-hp. motor gives the grinding belt a surface speed of 4500 ft. per minute.

Sierra Machinery Co., Inc., 141 W. Hazel St., Inglewood 3, Calif.

On More of America's Airplanes . . .

BENDIX-PACIFIC

ACCUMULATORS

Since 1941 when Bendix-Pacific introduced the first—and stronger—continuous shell spherical accumulator the hydraulic systems on the great majority of every military and commercial airplane have relied on Pacific Division's products.

Bendix-Pacific Spherical Accumulators for both 3000 PSI and 1500 PSI, are accepted for their light weight, greater strength, freedom from fragmentation and long life.

Since 1948 Bendix-Pacific also has pioneered the development of Cylindrical Accumulators. A complete line, incorporating the proven Bendix shear-ring end design, is in production in both the military standard and minimum weight types. Standard models for 3000 PSI with mounting rings and extended ports meet the military standard drawing MS 28700. Minimum weight models for both 1500 and 3000 PSI are equivalent in performance to the MIL type.

WRITE FOR COMPLETE INFORMATION

Pacific Division Bendix Aviation Corporation — North Hollywood, Calif. — **Bendix**

East Coast Office, 475 Fifth Ave., New York 17 • Export Division: Bendix International, 205 E. 42nd St., New York 17 • Canadian Distrib.: Aviation Electric, Ltd., Montreal

AIRCRAFT HYDRAULIC CONTROLS • AIRBORNE RADAR • SONAR • INDUSTRIAL HYDRAULIC CONTROLS • TELEMETERING • ELECTRO-MECHANICAL EQUIPMENT

Beech relies on MICRO switches to add safety to their BONANZA

MICRO has developed over 2,000 different switch types to meet military and civilian aircraft specifications.

MICRO
MAKERS OF PRECISION SWITCHES
FREEPORT, ILLINOIS

A DIVISION OF
MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

H
HONEYWELL

• Six MICRO precision switches were selected by Beech Aircraft Corporation's engineers to provide the utmost safety to both aircraft and passengers in landing operations.

One MICRO switch prevents the landing gear from being retracted until the plane is airborne. The weight of the plane on the landing gear holds the switch actuated.

Five MICRO switches in the landing gear limit switch cluster perform these functions:

- **Limit up-travel of landing gear by breaking circuit to landing gear motor.**
- **Apply up-brake to landing gear motor to prevent coasting of motor.**
- **Limit down-travel of landing gear by breaking circuit to landing gear motor.**
- **Apply down-brake to landing gear motor to prevent coasting of motor.**
- **Warn if landing gear circuit is in up position but plane is still on ground.**

Light weight, small size, precise action and *Absolute Dependability* of MICRO precision switches have made them first choice of aircraft designers. Meeting their exacting demands, MICRO has developed the most complete line of precise aircraft switches—and more are always being developed and tested. That is why it pays to bring your precision switch problem to MICRO first. Experienced field engineers, with many years of experience in aircraft switch problems, are available for consultation on your requirements. A call to the nearest MICRO branch may prove the best solution to your switch design problem.

Landing Gear Limit Switches

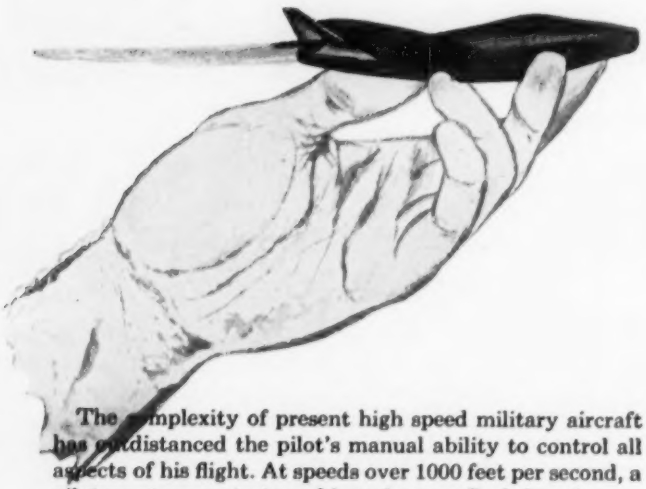
Landing gear limit switch cluster shown is located above the gear box in the Beech Bonanza. The five switches operate in MICRO roller leaf actuators to cut off power at a pre-determined position of the landing gear travel. This prevents damage to the gear mechanism which might result from slamming into full up or down position under power.

Landing Gear Safety Switch

Landing gear of Beech Bonanza showing location of MICRO switch in housing on the right shock strut. The switch closes the circuit when the shock strut is ¾ of an inch from the fully extended position. The switch shown is a split-contact switch operating in a standard MICRO actuator. It is enclosed in a Beech Aircraft housing.

the pilot's unseen helping hand—

AEROTEC AUTOMATIC CONTROLS



The complexity of present high speed military aircraft has outdistanced the pilot's manual ability to control all aspects of his flight. At speeds over 1000 feet per second, a pilot must concentrate on his trajectory. Such functions as fuel transfer, tank-pressure regulation, afterburner eyelid control, cabin pressurization and fuel-filter de-icing must be accomplished automatically. In these functions, AEROTEC Float Switches, Valves and Pressure Switches have contributed greatly to the solution of flight problems at trans-sonic speeds—truly a pilot's unseen helping hand!

AEROTEC Automatic Controls have passed extensive qualification tests *simulating actual flight conditions* in accordance with Spec MIL-E-5272. They are installed on such high speed aircraft as the Boeing B47B and B52, Grumman F9F-6, Northrop F89D and Lockheed F94C.

Constant research by AEROTEC Engineers into problems of hermetic sealing, high-pressure actuation, corrosion and high- and low-temperature conditions has maintained AEROTEC'S reputation as progressive designers and manufacturers of the highest quality products.

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Designers and Manufacturers of Automatic Controls—*Valves:* Regulating, Relief and Check types—*Pressure Switches:* Gage, Altitude, Differential and Absolute Types—*Float Switches:* Top, bottom or side mounted—Single, Dual or Tandem.

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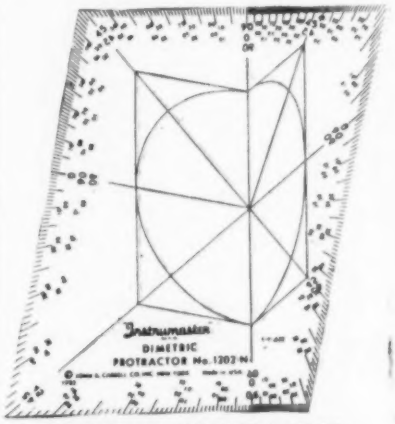
Model TC-1 temperature test chamber (—65 to 275F), now is equipped with thermometer as integral unit, eliminating need of replacing thermometers bent or broken by falling test objects. Forced circulation in this small tester prevents significant temperature variations between thermometer and part under test.—Statham Development Corp., 12411 W. Olympic Blvd., Los Angeles 64.

Junior Vacuum Leak Detectors have applications which cover a broad range of parts, fluid or airtight. Small parts, such as castings, weldments and assemblies can be tested on this equipment which is designed for bench location and is supplied with vacuum pumps built into the unit or engineered to fit the application. Offered in manual, semi-automatic or automatic models,



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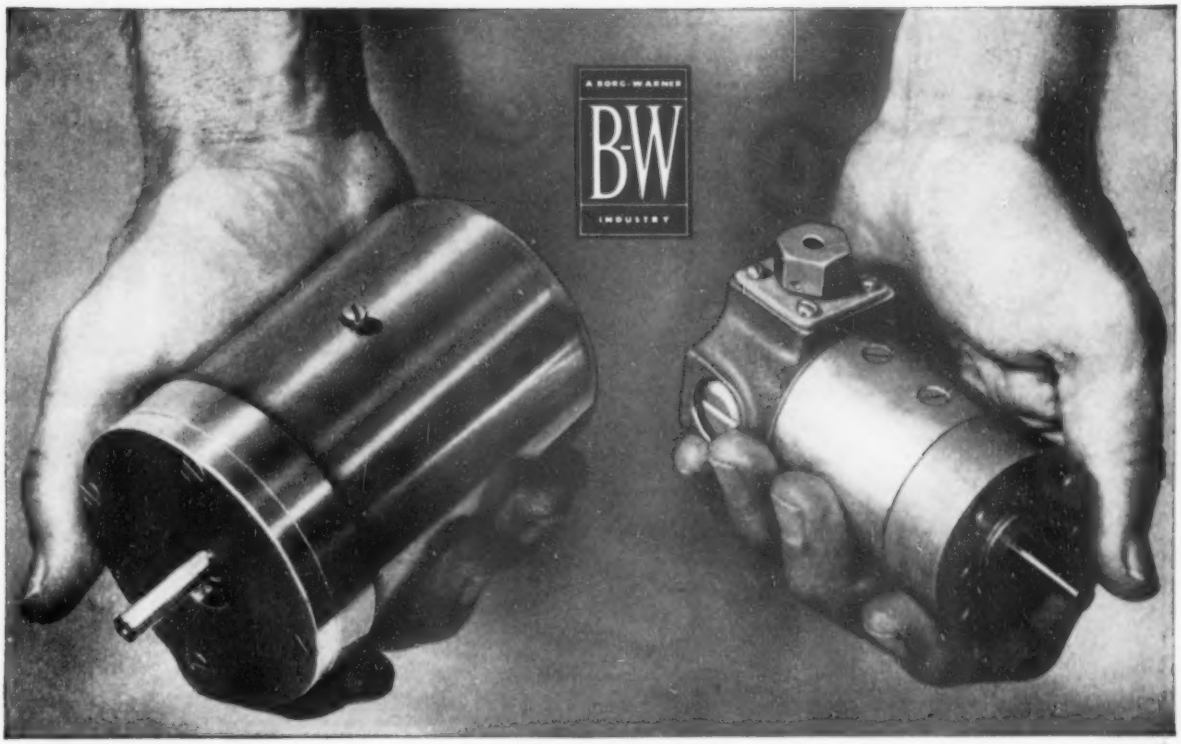
Dimetric protractor, said to be first of its type, can be used for measurement of angles in the axonometric planes of dimetric drawings. Made of vinyl, it contains graduations for 1:1 plane and two 1: .632 planes. Further details are available from John R. Cassell Co., Inc., 110 W. 42 St., New York 36.



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For example—Pesco motors are now in use for: cooling (blowers for electronic equipment), tuning (radios and automatic finders), scanning antenna (civilian and military), antiaircraft radar fire control, as well as pump drives and mechanical actuators.

By using standardized parts in a series of six co-ordinated frame sizes, Pesco can provide you with electric motors for electronic applications with voltages from 6 to 120 volts D. C.; from 1/100 to 6 H. P. for operating speeds up to 15,000 R. P. M. Special, high-altitude design will operate from −65° to + 165° F.

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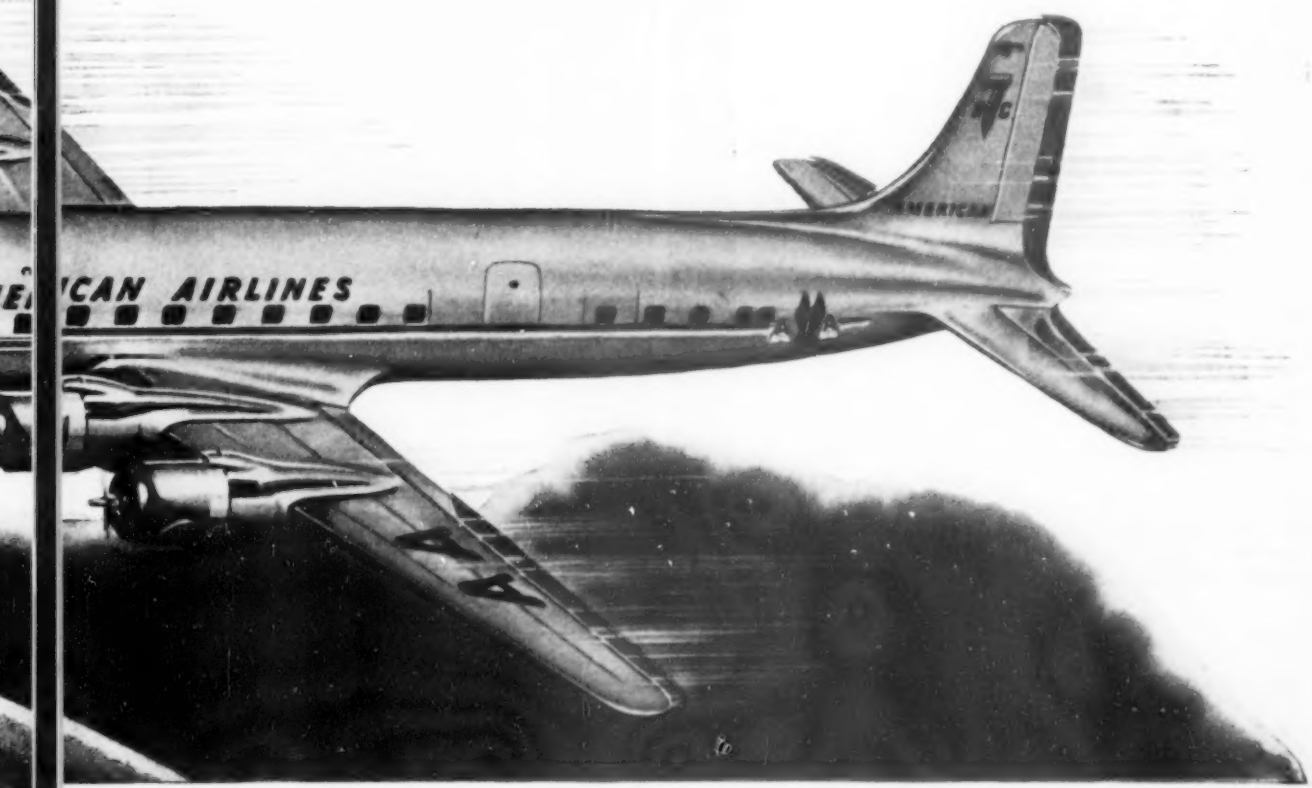

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providing units suitable for laboratory and random testing to production testing with "green" and "red" lights indicating test condition.—Whittington Pump & Engineering Corp., 1126 Prospect St., Indianapolis 3.

Faster hoisting in hangars and factories is claimed possible with Aro's latest air-operated hoist, a 28½-lb. midget (Model 7700) capable of lifting 1,000 lb. at 40 fpm. Throttle control regulates speed from zero up and safety brake automatically locks when control is released or air pressure fails. Both chain (8-ft. lift) and motor assembly are fitted with safety snap hooks.—Aro Equipment Corp., Bryan, O.

Non-magnetic chamber for determining effects of temperature on electrical fields in development testing of pure metals has range of −112 to 68F. Motors and other electrical apparatus are located far enough away to eliminate effects of their fields, while cabinet itself is made of non-steel construction. Special inner chamber, governed by vernier control, holds temperature to ±0.1F.—Bowser Technical Refrigeration, Terryville, Conn.

Motor overload relays and other protectors are said to be installation- and field-tested for proper operation more simply, safely and efficiently by the Multi-Amp portable tester, using compact step transformer to supply desired

amperage. Relays can be tripped at simulated motor overloads while remaining in circuit under environmental conditions, without need of overloading rest of circuit, motors, etc.—Multi-Amp Corp., Harrison, N. J.

Breather vents for aircraft relieve pressure differences in gear cases, oil tanks and similar enclosures that must be vented to atmosphere. Conforming to Naval and USAF specifications, the vents filter outside foreign matter and baffle against inside oil spillage.—Technical Development Co., 1128 Cherry St., Philadelphia 7.

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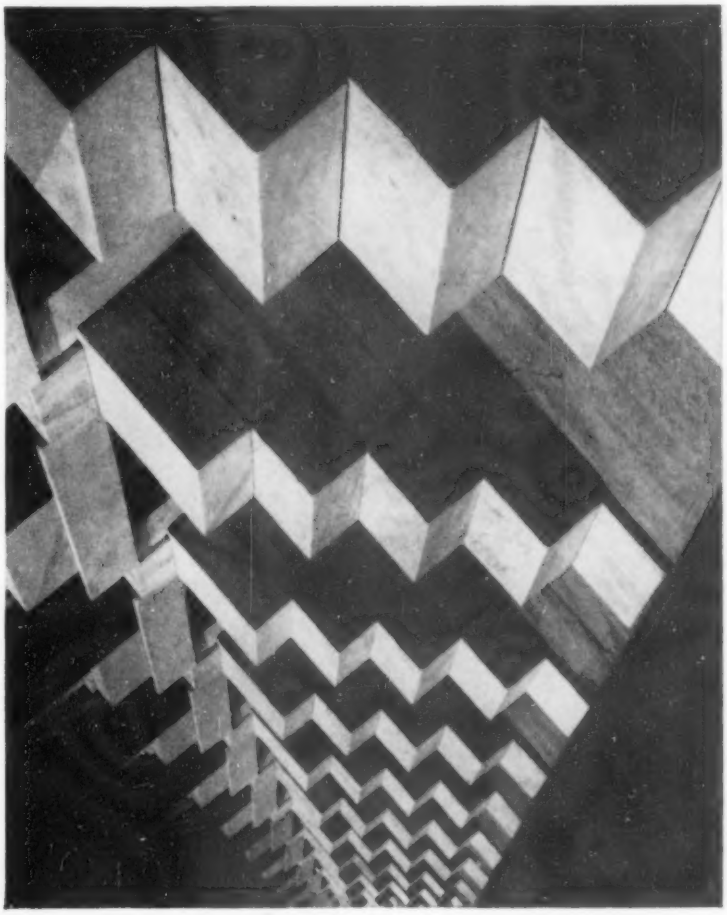

Photo from "My Maryland" A. Aubrey Bodine

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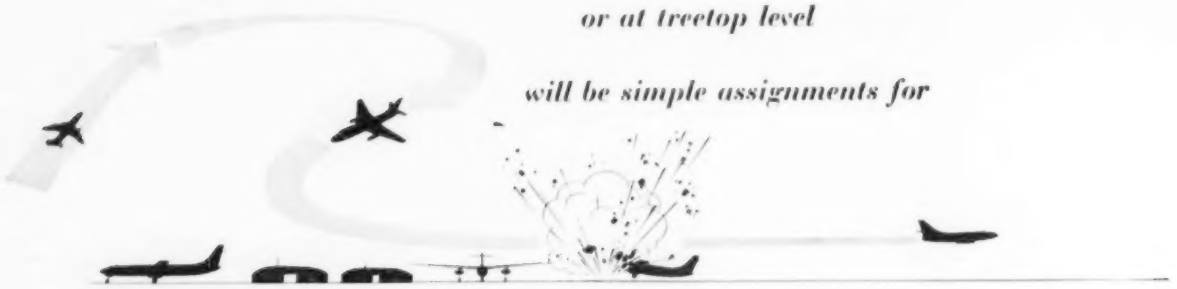

—the new Douglas B-66B

A versatile new Air Force bomber now moves from Douglas drawing boards toward service. Construction of the first B-66B is under way.

Twin jets, slung outboard on the wing will put B-66B in the 600 to 700 mph class, while special design will permit wide selection of bomb combinations for varied missions. Even with full bomb load, B-66B's efficient power-to-weight ratio will give ample range to travel far over enemy territory, and return. In speed, range and capacity it will be built to meet tactical requirements for delivering the most potent weapons in the nation's defense arsenal.

The design of B-66B is another example of Douglas leadership. Planes that can be produced in quantity to fly *faster and farther with a bigger payload* are a basic concept at Douglas.

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CAB Asks $80 Million for '55 Subsidies

- **Congressional approval of new budget expected.**
- **Board bases estimate on good business forecast.**

By Lee Moore

The $80-million airline subsidy appropriation request for fiscal 1955 submitted to the White House by Civil Aeronautics Board last week may be granted tentatively, but faces possible reduction next year by amendment of the Civil Aeronautics Act.

The subsidy budget is 1% less than the current year, 7% more than fiscal 1953, 12% more than 1952 and 6% more than 1951.

Administration economizers are becoming resigned to prevailing legal opinion that the Civil Aeronautics Act binds the government to subsidize operation of routes certificated by the Board. Therefore, Republican subsidy reduction will be a slow process.

▶ **Amend Act**—To suspend certain certificated services arbitrarily, the government probably would have to amend the Civil Aeronautics Act to provide guides for such action by the Board.

The new administration may rely solely on seeing that a majority of CAB members:

- **Curb certification** of new subsidy routes.
- **Suspend unsuccessful** temporary subsidized routes when due for renewal.
- **Continue setting** final mail rates instead of the "temporary" rates prevailing 1946-51.

▶ **Subsidy Trends**—The Board's new 1955 estimates make it appear that the trends of total subsidy and the individual route types are leveling off.

Looking at the $80-million subsidy budget from a route viewpoint, half is earmarked for international and a third for local service. Territorial is slated to get 13% and metropolitan helicopter development 3%.

The new budget would increase total subsidies $5 million—from $75 million to $80 million—in the five years from 1951 to 1955. While trunkline subsidies all but disappeared, dropping $15 million, international and territorial increased $10 million and local service $7 million.

Helicopter subsidy was not distinguished from compensatory mail pay until the current fiscal year. Current estimate is $2.5 million to carry the New York, Los Angeles and Chicago copter services.

The CAB forecast of its fiscal 1955 budget requirements is based on four main assumptions:

- **Continued good business.**
- **No new routes.**
- **No cost increases.**
- **No change in subsidy rates.** The Board report assumes no change in "the level of payments existing pursuant to final mail rate orders of the

Airline Subsidy Trends

	Fy. 1951	Fy. 1954	Fy. 1955
DOMESTIC			
Group 1:			
American	$1.0	0	0
Eastern	0.5	0	0
TWA	0.9	0	0
United	1.3	0	0
Group 2:			
Braniff-MCA	2.3	0.5	0.5
Capital	1.6	0	0
Delta-C&S	1.5	0	0
National	1.3	0	0
Northwest	4.2	0	0
Western	0.9	0	0
Group 3:			
Colonial	1.1	0.8	0.8
Continental	1.2	0.7	0.7
Northeast	1.1	1.6	1.6
Piedmont	1.2	1.6	1.6
Pioneer	1.1	1.0	1.0
Group 4:			
Frontier	2.4	2.9	2.9
Mohawk	0.9	1.0	1.0
Southwest	0.8	1.1	1.1
Group 5:			
Allegheny	1.8	1.8	1.8
Bonanza	0.6	0.9	0.9
North Central	1.2	2.5	2.5
Ozark	0.8	2.0	2.0
Southern	1.4	1.8	1.8
Trans-Texas	1.6	2.6	2.6
West Coast-Empire	1.2	1.6	1.6
Group 6:			
Central	0.9	1.7	1.7
Lake Central	0.6	1.5	1.5
HELICOPTERS			
HAS (Chicago)	N.A.	0.4	0.4
Los Angeles	N.A.	0.8	0.8
New York	N.A.	1.1	1.4
INTERNATIONAL & OVERSEAS			
Trans-Atlantic:			
Pan American	10.6	8.2	8.0
TWA	4.2	4.5	4.4
Latin America:			
Pan American	4.9	11.2	11.2
Braniff	2.0	3.0	2.9
Delta	1.6	0.7	0.7
Panagra	1.2	2.2	2.2
Caribbean-Atlantic	0.2	0.1	0.1
Trans-Pacific:			
Northwest	3.0	4.0	3.9
Pan American	7.8	7.9	7.8
Intra-Hawaiian:			
Hawaiian	...	0.6	0.6
TPA	...	0.5	0.5
U. S.-Alaska			
Alaska	...	1.2	1.2
Pacific-Northern	...	0.8	0.8
Pan American	0.8	1.3	1.3
Intra-Alaska:			
Nine lines	2.5	4.7	4.7
Stub-end domestic:			
Five lines	0.4	...	...

Source: CAB revised report, September, 1952.

Airline Subsidy Estimates

	Fy. 1951	Fy. 1952	Fy. 1953	Fy. 1954	Fy. 1955
	(In millions of dollars)				
Trunklines	$18.9	$6.3	$4.2	$3.6	$3.6
Local service	17.1	18.9	22.0	23.9	23.8
Helicopter	N.A.	N.A.	N.A.	2.3	2.6
International*	39.3	45.3	49.5	50.9	50.3
Total	**75.2**	**70.6**	**75.7**	**80.7**	**80.3**

Source: CAB, administrative separation of subsidy from total mail payments to U.S. air carriers, September 1953 revision.
N.A.: Not available. CAB counted all copter payments as compensatory mail pay until the current revision.
*International and territorial service are lumped together in the CAB report, but a rough breakdown for 1955 would show $9-10 million territorial and $40-41 million international.

Share of Subsidy

Route Type:	
International	50%
Territorial	13
Domestic:	
Local service	34
Helicopter	3
Trunklines	0
Total	**100%**

Source: AVIATION WEEK computation from CAB revised subsidy report, September 1953, for fiscal 1955.

Board as of the most recent date preceding completion of this report" (Aug. 11, 1953).

A mail-rate official says approximate future final rates were estimated for those airlines still on temporary rates as of that date. (Final rates include fair return on investment; temporary rates are set to break even only.)

▶ **Subsidy Separation**—Post Office next month starts paying airlines only for the actual cost plus fair profit for hauling airmail. In all previous years, the subsidy and mail pay were paid in lump sum by Post Office.

CAB will begin paying airline subsidies totally separate from mail pay next month. The Board already has asked a $27,000 supplemental appropriation to administer its new job of paying the airline subsidies for the nine months remaining in fiscal 1954. Before, a Post Office staff administered these payments.

▶ **$27,000 Short**—Congress cut the CAB administrative budget $50,000 from last year's $3.8 million, reducing it to $3,750,000 for fiscal 1954.

The President simultaneously transferred to CAB the job of subsidy payment. The Board figures this will cost about $72,000 a year, but Post Office transferred only $27,000 to CAB to handle the job through the next nine months. So CAB asked the Budget Bureau to request another $27,000 to boost total subsidy administration budget to $54,000 for the nine months ending June 30.

The Board said administration of payments would be more efficient if the Post Office staff continued to handle the job with transfer of CAB administrative funds, but the Postmaster General refused.

▶ **Straight Mail Pay**—CAB estimates compensatory mail pay for the airlines at $58 million in fiscal 1955, compared with $56 million this year, $54 million last year, $52 million in 1952 and $44 million for 1951.

These figures are based on Board estimates of mail ton-mile volume and the compensatory cost rate per ton-mile. CAB segregates the airlines' ton-mile costs by groups (Table, p. 87). Group 1 (American, Eastern, TWA and United) is paid 45 cents a ton-mile for mail service; Group 2, 53 cents; Group 3 75 cents; Group 4, 91 cents; Group 5, $1.48; Group 6, $2.58; trans-Atlantic, 85 cents; Latin American, 59 cents to $1.38; trans-Pacific, 67 cents; intra-Hawaiian, 81 cents; U.S.-Alaskan, 47 cents; intra-Alaskan, $1.29 to $2.50.

Subsidies CAB starts paying next month will be the additional rates above mail pay needed by each airline to break even plus a "fair" (7-11%) return on their investment in transport operations.

CAB ORDERS

(Week of Sept. 7-13)

Granted:

Central Airlines special permission to shuffle routes Sept. 26 to handle Oklahoma-Notre Dame football crowds.

West Coast Airlines subsidy mail rate estimated to yield $1,614,528 a year as proposed by CAB last May 26, effective from Aug. 1, 1952, forward.

Mohawk Airlines intervention in Niagara Falls Airport case.

Bonanza Air Lines route renewal intervention by 10 civil bodies in California; case is service to Yuma and El Centro.

Laurentide Aviation, Ltd., temporary foreign air carrier permit.

Proposed:

Experimental low mail rates for preferential first-class (surface) mail, as urged by Postmaster General. Rate of 20.03 cents a ton-mile Chicago-Washington and 18.66 cents Chicago-New York is proposed for non-priority service (load only when extra space is available) for 12 months ending Sept. 30 next year.

Approved:

Interlocking relationships of Nathan Bronstein as secretary and treasurer of Airport Associates (air taxi) and sole proprietor of Air Freightways (forwarder).

Routine inter-airline agreements among contracting groups of airlines.

Western Air Lines suspension of service to Jackson, Wyo., for the winter. Lack of facilities, plus runway construction, make it inadvisable for winter scheduling. Business also is seasonal.

Pan American World Airways temporary suspension of service to Maturin, Venezuela, in conformance with PAA-Venezuela contract, and new U.S.-Venezuela agreement.

Denied:

American Airlines motion to dismiss CAB investigation proposing that American serve Nogales, Ariz.

American Airlines motion to dismiss Economy Airways from CAB large irregular carrier investigation.

Dismissed:

Northwest Airlines complaint against Pacific Northern Airlines fare. PNA special passenger fare on Anchorage-Seattle cargo flights is fair, CAB finds.

National Airlines and Delta-C & S Air Lines complaint against Eastern Air Lines daylight coach service with 88-seat Super Constellations.

Metropolitan Air Freight Depot, Inc., from CAB freight forwarder investigation, at company's request.

Interlocking directorships proposed by Amos Heacock, Air Transport Associates, John A. Belding and Continental Charters, now withdrawn by the parties themselves. They applied last Jan. 27 for approval of Heacock's and Belding's directorship of Aircraft Engineering Foundation while holding official positions with the two nonsked carriers, ATA, Inc. and Continental Charters.

LAV to Buy Third Comet

Lineas Aeropostal Venezolana (LAV) plans to purchase a third de Havilland Comet. The carrier expects to take delivery of its Comets beginning in early 1954.

Board Explains Airmail Action

Civil Aeronautics Board last week explained the quick approval which it had given Post Office Department's experimental rates for airline hauling of first-class mail 60% cheaper than straight airmail as follows:

"Obviously, a class of mail service that does not enjoy the advantages of mail bearing airmail postage which is transported under absolute obligation on the part of the carriers and under the highest priority, is entitled to a lower rate, but exactly how much lower is practically impossible to determine in the absence of any specific experience with that type of service.

"We can gather some indication . . . from the assignment of costs we made to compensate for the type of airmail service now in effect . . . and we get some aid from a consideration of the rates now in effect for property and passenger services. The cost of surface transportation of such mail submitted by the Postmaster General is also a help.

"While all of these . . . are not as sufficient as we would normally require, we find that in view of the relatively small impact upon the total operations of the carriers that might be involved in this limited experiment, the impossibility of securing adequate data before the experiment has progressed, the fact that United and American have indicated their willingness to go along, the substantial public interest to be served in the proper development of the new service, and the fact that the Postmaster General has reached an advanced stage of preparation for conducting the experiment, the rate proposed herein for this new class of mail service should be fixed as the fair and reasonable rate."

CAB Approves Cut-Rate Airmail

Civil Aeronautics Board acted faster than at any time in its rate-making history to accept cut-rate prices proposed by Postmaster General Arthur Summerfield for airline hauling of preferential first-class mail, as predicted by AVIATION WEEK (May 25, p. 17, June 15, p. 9).

Considering the revolutionary potential of the new rates, 60% under straight airmail, some Washington observers saw the Board's alacrity as indicating the Republican Administration will guide CAB on many broad policy questions (AVIATION WEEK Aug. 10, p. 9).

▶ **Mail Restudy**—Main worry of airlines and some CAB members is that the new first-class mail airlift may undermine straight airmail rates set by the Board. CAB staff already has been instructed to restudy its compensatory mail rates this winter when it gets sufficient time.

Yet, within the week that Summerfield set his rate ceiling, CAB issued a show-cause order approving the rates, and United and American indicated acceptance of the low rates.

The experimental rates are 18.6 cents a ton-mile New York-Chicago and 20.04 cents Washington-Chicago. They compare with straight airmail rates of 45 cents a ton-mile for American, TWA and United and 53 cents for Capital on the same routes. Main difference in service will be that the first-class will have no priority. It will move on space-available basis only.

▶ **Beats Rail Rates**—Post Office computed these rates as its present direct and indirect cost of rail shipment. Washington observers expect most airlines to accept this offer. Airlines thus would provide overnight mail delivery at the same or lower cost to Post Office than second-day delivery provided by rail shipment.

▶ **Only a Starter**—While these two routes will be operated experimentally for one year, Summerfield plans to expand the program to cover many major U. S. routes. He said the experiment is undertaken "with a view toward expanding such service in the future when it is established by experience that an expansion of the program would be in the public interest."

Summerfield said he believes "there are many instances where air transportation can provide a much improved service to the public at a cost to the department comparable to or lower than the cost of available surface transportation."

▶ **The Service**—Post Office will dispatch first-class mail by air on a "space-available" basis—that is, without priority and at the convenience of the carrier—within a given time limit. Thus the mail will use aircraft capacity that otherwise would go empty.

Meanwhile, Post Office says it is arranging speedier transfer of mail between Post Office and airport.

Mail in the three metropolitan areas —Chicago, Washington and New York —normally will be routed to the airport instead of the rail terminal, but there is no guarantee of this expedited service for first-class mail. The only way to be sure of air shipment is the 6-cent airmail stamp instead of the regular 3-cent stamp. Only "preferential" first-class mail will get the treatment—letters, postcards and news journals on which fast delivery is definitely an advantage. Packages will not go by air, unless they carry the airmail stamp rate.

The three cities will not be the only direct beneficiaries of the experiment. Postal officials said out-of-town mail passing through the Chicago gateway will be dispatched by air, too. This will save 24 hours or more on many transcontinental shipments.

▶ **The Airlines**—American, Capital, TWA and United are certificated by CAB to serve the two routes. United moved immediately to file tariffs at CAB meeting the Post Offices's 18- and 20-cent maxima. American filed next and TWA was expected to follow. Capital appeared the most dubious: CAP treasurer Ray Lochiel said the Post Office rate and volume estimates made the proposed tariff higher than present airfreight rates for similar bulk of similar commodities.

Flying Tiger Line and Slick Airways petitioned CAB for permission to haul mail on the same routes, but their certificates do not presently permit mail carriage. Their petitions are expected to lead to a separate, lengthy proceeding at CAB, whereas bulk mail tariffs of AA, CAP, TWA and UAL could get rapid approval if outside parties do not complicate the rate case by legal maneuvers.

National President Receives $71,631

National Airlines paid its president, G. T. Baker, $30,000 salary and $41,631 bonus during 1952, the carrier reported to Securities & Exchange Commission.

Other NAL salaries:

J. C. Brawner, treasurer, $12,000 and $16,852 bonus; R. P. Foreman, secretary, $12,000 and $16,852 bonus; E. J. Kershaw, vice president-operations, $16,000 and $22,469 bonus; J. L. Morris, vice president, $12,000 and $16,852 bonus; J. M. Rosenthal, vice president industrial relations, $12,000 and $16,852 bonus; W. Sternberg, vice president-sales, $18,333 and $25,746 bonus; C. H. Calhoun, vice president-engineering, $12,750 and $12,639 bonus; C. F. Sharp, assistant vice president-sales, $9,600 and $10,532 bonus; R. E. Wieland, regional vice president-New York, $12,000 and $16,852 bonus; W. F. Johnston, assistant secretary-treasurer-comptroller, $10,350 and $14,535 bonus.

REPORT TO OUR ADVERTISERS . . .

Eight months of progress climaxed by the biggest issue and the biggest month in AVIATION WEEK history . . . a record 427.57 advertising pages for August 1953.

***AVIATION WEEK** believes that its advertisers—an audience that continues to grow substantially with each passing month—are due a progress report on their favorite magazine.*

***We have** just published a record 454 page issue, the August 17 edition, as well as the biggest advertising month in Aeronautical publishing history. The August advertising figure, 427.57 pages, as well as AVIATION WEEK's eight months 1953 total of 2,344 advertising pages represents more space than the combined total of the next three Aviation publications. With this whopping total AVIATION WEEK for the second year heads for that select group of young and old pros comprising the 25 largest consumer and business magazines in the nation. Heady stuff!*

***This solid achievement** of AVIATION WEEK is further spelled out by its uninterrupted progress to record industry acceptance and advertising volume, a fact convincingly illustrated by its yearly advertising figures: 1950—1,680.92 pages, 1951—2,541.95 pages, 1952—3,248.07 pages, 1953—3,425 estimated pages. With volume such as this, it becomes futile to speak of rate of growth comparisons. From 50 to 100 pages monthly represents a 100% gain, but the net result is something less than substantial in terms of industry potential. In publishing perspective, a gain from 225 to 250 advertising pages a month—a 7.7% gain—which on first inspection does not sound so impressive, is far more to be desired. Experienced buyers of magazine advertising space happily are in the know as far as Aviation space is concerned. They pay little, if any attention, to such percentage comparisons. Long ago they marked them as deceptive and unreliable unless such claims were advanced where equal or near equal advertising volume was involved. In the Aeronautical field the advertising leadership of AVIATION WEEK has been unchallenged and uninterrupted for many years . . . year after year this publication has published more than the combined total of the next three publications.*

***Advertising figures** such as these, however, tell only a partial story of AVIATION WEEK*

progress. Along with them go the expansion of our editorial services, with a staff now numbering 18 full-time editors, skilled Engineering and News specialists recognized throughout the industry. In the last eight months, in addition to their regular AVIATION WEEK writings, products of their talent have appeared in the SATURDAY EVENING POST, READERS DIGEST, HARPERS Magazine and on Major National Television Channels. Their achievements are ones in which we take considerable pride. They are an indication of the caliber of our staff. Supplementing their services are eight domestic News Bureaus, the services of Press, Inc., subsidiary of the Associated Press, Inc., foreign news offices in London, Paris, Frankfurt, Manila, Mexico City, Sao Paulo and Tokyo, and correspondents in the principal cities of the world.

***This heavy concentration** of editorial talent and resources has resulted in the building of a reader preference unique in the business publication field. It is a record that has been exhaustively tested by the industry itself through their own reader preference studies. Of twenty-seven conducted through engineering and management departments, customer lists and directories AVIATION WEEK has won them all – and not closely but by a better than 4 to 1 average. It is our standing offer to any manufacturer to conduct his own reader preference study, if he wants to get at the facts of reader preference and magazine pulling power. We'll gladly pick up the check, if he desires. This record of reader preference has stood for years, increasing in momentum, and explains why when orders and inquiries of merit are wanted, AVIATION WEEK is always first at bat.*

***Our growing audience** of AVIATION WEEK paid subscribers ($6.00 per year) continues to rise significantly. There are 10,000 more on the books since last year, making up a current total of over 45,000 net paid subscribers, (42,743, 6/30/53 ABC statement). Likewise our book-value rises importantly as indicated by our all-time high renewal percentage.*

***These facts** and figures should serve in some small measure to make clear AVIATION WEEK's position among the powerful, independent publications of today. They are furnished to you with a deep sense of gratification because through you we were able to achieve them.*

AVIATION WEEK
A McGRAW-HILL PUBLICATION – ABC • ABP

Look to the Sky for Your Market

McGRAW-HILL PUBLISHING COMPANY, INC., 330 WEST 42 STREET, NEW YORK 36, NEW YORK

Other Advertising Sales Offices: Atlanta, Ga. • Boston, Mass. • Chicago, Ill. • Cleveland, Ohio • Dallas, Texas • Detroit, Mich. • Los Angeles, Calif. • Pittsburgh, Pa. • Philadelphia, Pa. • San Francisco, Calif. • St. Louis, Mo. • London, England.

Newer Connies

- **Lockheed works out plan for switch to turboprop.**
- **1249B versions would compete with Britannia.**

Lockheed Aircraft Corp. has worked out detailed plans to convert the Super Constellation to turboprop power to meet British competition and extend the airplane's already long competitive life to 1966, company officials have told AVIATION WEEK.

No airlines have yet placed orders for Super Connies with turbine powerplants, Lockheed officials acknowledge, but interest in the plane's capacity for conversion probably has been a deciding factor in successful sales of the present piston engine models, they say.

In accordance with this customer interest, all Super Constellations delivered after January 1954 will be stressed for speedy conversion to turboprop powerplants. Earlier deliveries of the approximately 100 Super Connies on order can be modified prior to handing over to the customer so that they also will be able to take the new engines.

Two versions (domestic and international) of the turboprop Super Connie have been planned. Standard domestic version will seat 65, plus four additional passengers in the lounge. There also will be 89 seats in the tourist model and 99 in the high-density type. The international service models would seat 59 passengers, plus four in the lounge, in standard configuration, 82 tourists or 94 passengers as a high-density airliner.

▶**P&WA Engine**—Lockheed engines have considered the 5,600-eshp. P&WA PT2F-1 as the powerplant for the newest Super Connie, designated the 1249B. However, the engine-maker recently announced it has withdrawn the PT2F-1 from sale "until a market of considerable magnitude has been developed to make its commercial manufacture economically feasible" (AVIATION WEEK Sept. 14, p. 17).

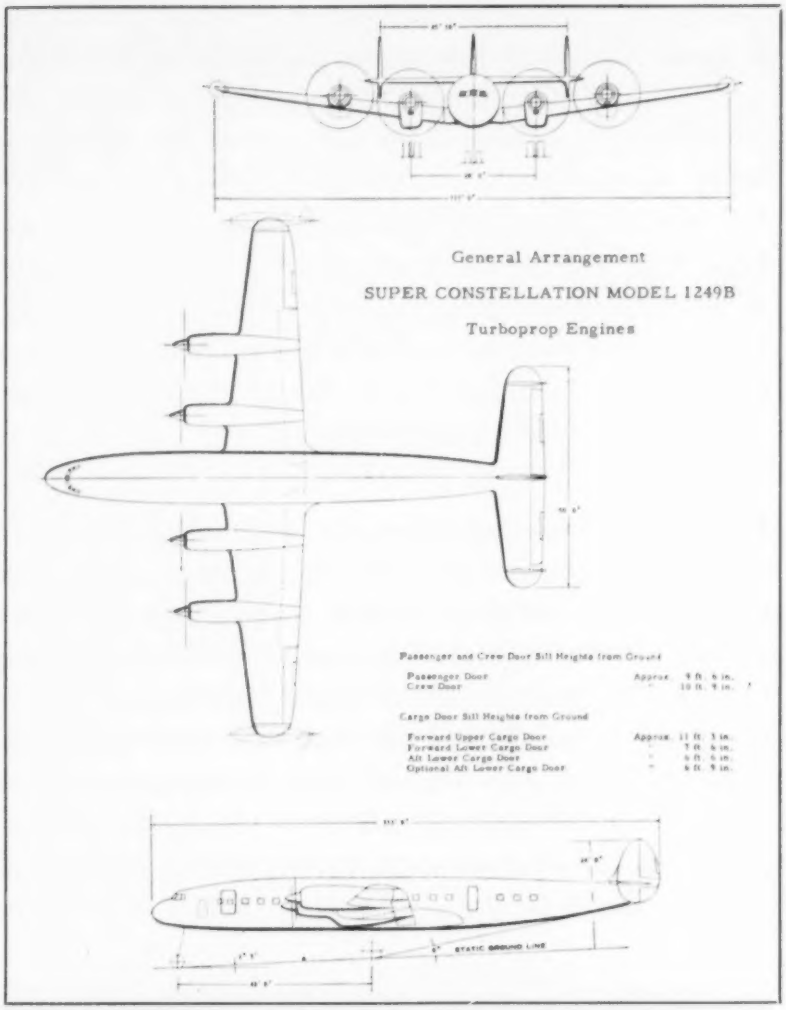
Industry observers speculate that should the 1249B materialize, it would use later, more powerful turboprops now in the works for commercial and military transport applications.

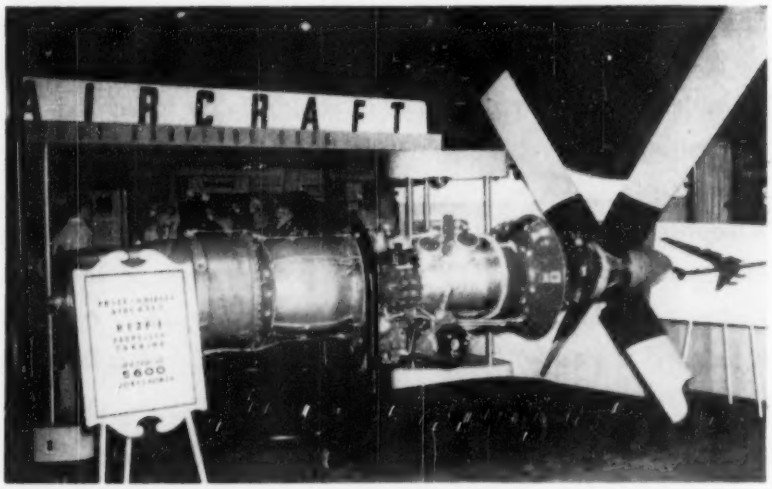
According to P&WA, the PT2F-1 weighs only 2,564 lb. and has a length of 157.4 in. and diameter of 34 in. Specific fuel consumption is .64 lb. at takeoff at sea level, decreasing with altitude.

▶**Other Features**—The engine has a three-stage turbine and a 13-stage compressor. A negative thrust control system will suppress the drag from a windmilling prop prior to feathering. The PT2F-1 also has these additional features:

- Advanced fuel control design that "senses" airflow to the burners.
- Telescoping cover for the burners to allow easy access to liner components for servicing.

The turboprop 1249B will be fitted with three-blade Hamilton Standard Turbo-Hydromatic propellers.


General Arrangement
SUPER CONSTELLATION MODEL 1249B
Turboprop Engines
Passenger and Crew Door Sill Heights from Ground
Passenger Door Approx. 9 ft. 6 in.
Crew Door " 10 ft. 9 in.
Cargo Door Sill Heights from Ground
Forward Upper Cargo Door Approx. 11 ft. 3 in.
Forward Lower Cargo Door " 7 ft. 6 in.
Aft Lower Cargo Door " 6 ft. 6 in.
Optional Aft Lower Cargo Door " 8 ft. 9 in.
STATIC GROUND LINE



P&WA PT2F-1 is engine Lockheed engineers have chosen for turboprop Super Connie.

▶ **Military Versions**—It can be expected that Lockheed and airline operators will be able to gain considerable experience from watching how the military models of the Super Connie—now being built for the Air Force and Navy—develop. The Air Force C-121 and Navy R7V-2, two of which are on order by each of the services, will use the military version of the PT2F-1—the T34—and the new turbo-hydromatic props. First of the military turboprop Super Connies is expected to fly early in 1954. First production models of the T34 engine are expected to leave the factory early next year.

P&WA says that the T34 has completed an official 100-hr. engine-propeller control test, one of the most sensitive areas in achieving successful turboprop operation." The engine has also undergone 150-hr tests with JP-4 and gasoline, according to the manufacturer.

▶ **British Competition**—Combining the well-proven Super Connie airframe and engines tested by the Air Force and Navy should provide Lockheed a flying article sharply competitive in size and speed with the 100-passenger Bristol Britannia turboprop, an all-new aircraft which is being pushed to capture the high-density market held so long by conventionally powered U.S. Douglas and Lockheed transports. As if answering this challenge, Bristol has made plans for a "stretched-out" Britannia.

▶ **Connie Capacity Up**—Lockheed officials say that the conversion to turboprop engines will increase the plane's work capacity 22% from 3,720 ton-miles per hour to 4,560 ton-miles per hour. Maximum takeoff weight will be boosted from 133,000 lb. to 150,000 lb. at 110,000-lb. maximum landing weight, the 1249 version will cruise at 411 mph. At sea level the Lockheed turboprop airliner will clear a 50-ft obstacle in 2,900 ft. at maximum takeoff weight compared to the 1049E requirement for 4,600 ft. to clear this obstacle at 133,000 lb.

The 1249 Super Connie will be able to land and stop in 3,340 ft. after coming over a 50-ft. obstacle, says Lockheed.

Block speed of 385 mph. is calculated for a 2,500-mi. flight, using 600-gal. tip-tanks, providing a fuel capacity of 7,750 gal. compared with the 1049's 6,650. The 1249B is designed to fly at 368 mph. using 85% normal power at full gross takeoff weight.

Preliminary studies indicate operation of the 1249B will be lower than the piston engine Super Connie, even on short hops, says W. M. Hawkins, Lockheed chief preliminary design engineer.

He estimates overhaul periods soon would be comparable to piston engines, although "it might require 200-500 hr. between overhauls for a while."

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT: "OPPORTUNITIES" :EQUIPMENT
BUSINESS: :USED OR RESALE

UNDISPLAYED —RATES— **DISPLAYED**

$1.50 a line, minimum 3 lines. To figure advance payment count 5 average words as a line.

Position Wanted & Individual Selling Opportunity Wanted undisplayed advertising rate is ½ the above rates payable in advance.

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Discount of 10% if full payment is made in advance for 4 consecutive insertions.

Individual Spaces with border rules for prominent display of advertisements.

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and OTHER TECHNICAL PERSONNEL

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EXCELLENT OPPORTUNITIES

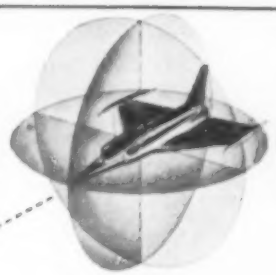
HOUSING READILY AVAILABLE

ATTENTION ENGINEERING PERSONNEL

BOX 6191, DALLAS, TEXAS

Top-Notch

SENIOR AERONAUTICAL ENGINEER



in AIRCRAFT or MISSILE AUTOMATIC CONTROL

wanted by

Send resumé of training and experience to M. L. TAYLOR, Engineering Personnel Dept. 6-R

CONVAIR

IN FRIENDLY FORT WORTH, TEXAS

CONSOLIDATED VULTEE AIRCRAFT CORP.

FORT WORTH, TEXAS

HAVE YOU EVER THOUGHT OF A GENERAL MOTORS' CAREER?

AC QUALITY PRODUCTS

ENGINEERS Electronic Servo

DESIGNERS Electro-Mechanical

RIGHT now we have unusually attractive project assignments at our Milwaukee plant for high caliber engineers. Some of the necessary qualifications are—experience in research, analysis, and/or design and development . . . in any of these fields:

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SERVO-MECHANISMS
COMPUTERS
AVIONICS

These will be permanent positions inasmuch as our operations consist of extensive manufacturing as well as development programs. At AC SPARK PLUG you will be part of a steadily expanding division of G.M.C.—a division with over 20 years' experience in the instrument field. With us you profit from "small-company" advancement opportunities plus "large-company" employee benefits. ADVANCEMENT FROM WITHIN is a fact, not a phrase. Let your next step be a letter to

SUPERVISOR OF EMPLOYMENT

FIELD ENGINEERS

Assignment—you will assist in the installation, operation, and maintenance of our equipment at aircraft plants and Air Force bases. The work will include liaison between AC and the customer, training of customer personnel, analysis of problems, and recommendations for improvements. Many of these outstanding openings are one-year overseas assignments.

Your Background—your educational background can be in any of the fields of AE, EE, ME, Physics, or equivalent. To be successful in these positions you should have a definite interest in people as individuals and be willing to relocate to field assignments. Single men given preference.

Training—our theoretical and applied in-plant training (here in Milwaukee) will prepare you for these assignments. In addition to your salary, you will receive a field allowance—and a substantial bonus if selected for overseas assignment . . . if you're looking for an opportunity with a "present" and a future write us for further facts.

AC Spark Plug Division • GENERAL MOTORS CORPORATION
1925 E. KENILWORTH PL. MILWAUKEE 2, WIS.

GRAND OPENING:

CHIEF ENGINEER!

As Chief Engineer, you will play an essential role in one of the foremost aeronautical instrument companies in the U. S., well established, solidly capitalized—alert and growing. The location is considered the best on the Eastern Seaboard. Requirements are 15 years experience in the aeronautical and industrial instrumentation fields, including 5 years as Chief Engineer of a recognized instrument company. Proven administrative ability is essential; growing pains are frequent here. Ceiling unlimited. Salary open. We would appreciate a detailed resume. Personal elaboration is welcome, but not required. Your reply will be held in strict confidence. Address it to

P-9104, AVIATION WEEK,
330 W. 42 St., New York 36, N. Y.

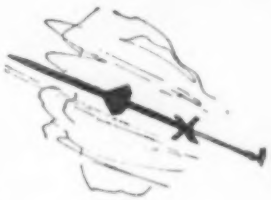
An Opportunity

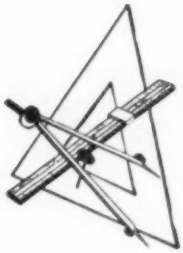
is offered for intelligent, imaginative engineers and scientists to join the staff of a progressive and self-sustaining, university-affiliated research and development laboratory. We are desirous of expanding our permanent staff in such fields as design studies of advanced supersonic aircraft, analytical and experimental studies of aeroelasticity, helicopters, aircraft structures, control and stability, large scale wind tunnel testing, and in various other applied research fields of aeronautics.

Salary structure and benefit programs are on a par with industry. In addition, there are many tangible advantages, such as our self-sponsored internal research policy, of interest to men with ingenuity and initiative.

CORNELL AERONAUTICAL LABORATORY, INC.
BUFFALO 21, NEW YORK

Help Build Tomorrow's World TODAY!





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DESIGN AND DEVELOPMENT engineering opportunities are available for capable and imaginative men and women in the field of airships, aircraft and aircraft components.

RESEARCH AND DEVELOPMENT projects — missiles, electric and electronics systems, servomechanisms, new special devices, fiber resin laminates — all present an urgent need for engineers with fresh talent, aptitude and ambition.

POSITIONS ARE OPEN at several levels in various fields with salaries based on education, ability and experience.

Physicists	Civil engineers
Mechanical engineers	Electrical engineers
Aeronautical engineers	Technical editors
Welding engineers	Technical illustrators

AKRON, THE HOME OF GOODYEAR AIRCRAFT, is located in the lake region of northeastern Ohio. Cosmopolitan living, year-round sports and recreation, cultural and educational advantages make this thriving city an ideal spot for a pleasant home.

YES, BUILD YOUR FUTURE — TODAY! Write, giving your qualifications, or requesting an application form.

C. G. Jones, Salary Personnel Department

GOODYEAR AIRCRAFT CORPORATION, 1210 MASSILLON RD., AKRON 15, OHIO

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more technical representatives

To represent a leading aviation instrument manufacturer. This company is still young, aggressive, and pays well for the men it wants. The name is synonymous with the most advance design in its field. Requirements are, *1. Engineering degree* in EE, ME, or AE, plus experience in electronic or electro-mechanical equipment—preferably aircraft. *Or, 2. Ten years experience* in electronic or electro-mechanical equipment, preferably A/C. You need, further, a friendly personality and ability to get along with people. You must be willing to travel and relocate. Subsistence is provided in addition to salary. Special bonuses are paid for overseas assignments. We are an organization you will be proud to belong to, and to grow with. Address your resume, and any personal details you care to include, to

RW 9213 Aviation Week,
330 W. 42nd St., New York 36, N. Y.

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITION VACANT

WANTED—QUALIFIED Pilots with minimum of 1500 hours C-46 time. Send resume of experience and qualifications, including employment history last five years and resume of flight by type of aircraft. P-9178, Aviation Week.

POSITIONS WANTED

GOVERNMENT CONTRACT Specialist: Attorney; Chief contract branch Air Force Procurement Program Europe past two years; knowledge European tax and Business practices. Resume on request. PW-9209, Aviation Week.

AVAILABLE AFTER Nov. '53. Experienced pilot desiring position as Company Pilot. Twelve yrs and over 5000 hrs of safe sane flying. Experience includes; Charter flying, instructor, (of many now flying airline pilots) of instruments & single-multi Eng. aircraft. 2½ yrs college plus considerable knowledge in Electrical Mfg. & Constr. industry. Presently flying in Foreign Gov't. Airforce as instructor. PW-9026, Aviation Week.

CO-PILOT MECHANIC desires position in executive flying in Eastern U. S. Holds commercial and W.M.E.I. Flight Instructor ratings plus A and E license 2900 hours total time 700 hours multi engine time presently employed. Contact Edmund J. Jason, 20072 Andover Street, Detroit, Michigan.

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Wanted—Aircraft seats for DC-3.
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Co-Owner for Cessna 195B Wanted:
We are a small company having limited use for our new Cessna 195B aircraft. We desire another company or responsible individual as Co-Owner. Equipment receives best maintenance and is hangered in N. Y. Met. area. BO-9207, Aviation Week.

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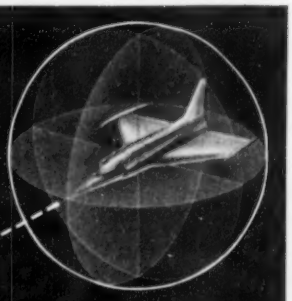
International Ferry Service—Two multi-engine ferry crews available. Experienced North Atlantic and European Operations. Pilot, Co-Pilot, Flight, Radio operators, and navigator or any combination of above Personnel. Also will consider long term or permanent situation. SS-9215, Aviation Week.

Enterprising
SENIOR AERONAUTICAL ENGINEER
in STABILITY and CONTROL
wanted by



Send resumé of training and experience to M. L. TAYLOR, Engineering Personnel Dept. 6-R

CONVAIR
IN FRIENDLY FORT WORTH, TEXAS

CONSOLIDATED VULTEE AIRCRAFT CORP.
FORT WORTH, TEXAS

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AVAILABLE
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If you have a product for the aviation industry, we can assume your merchandising problems. We have years of experience in national distribution and direct selling plus a thorough knowledge of the aviation business.

RA-9146, Aviation Week
330 W. 42nd St., New York 36, N. Y.

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For young man (25 to 35 years) in the Safety Design Engineering field. Position with University group doing research on aircraft accident survival problems. Ability to think objectively and the desire to learn are imperative requirements. A working experience with aircraft and structures is desirable. An aeronautical or Mechanical Engineering Degree is also desirable but not a requisite. Send resume and snapshot if available to:

A. HOWARD HASDROOK
CRASH INJURY RESEARCH
1300 YORK AVENUE New York 21, N. Y.

Attention
ENGINEERS and MECHANICS
Just off the press
DESIGN MANUAL
FOR THE REPAIR OF
ALUMINUM ALLOY STRUCTURES
200 pp.—Fully illustrated
Most complete book of its kind
Price $3.50 postpaid
No C. O. D.'s. Send Check or M. O.
JOHNSON RESEARCH CORP.
Dept. 93, Bethpage, L. I., N. Y.

UNUSUAL OPPORTUNITIES
can be found each week in the
SEARCHLIGHT SECTION OF AVIATION WEEK

A GOOD CONNECTION

That's what the jet pilot says when he "plugs into" the FR refueling system and that's what forward-thinking engineering personnel say when they study the opportunity for growth with Flight Refueling, Inc., a company expanding on a sound, long-range basis in the whole new field of in-flight refueling.

We have immediate openings with a future for:

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CHECKERS
PROJECT ENGINEERS
TEST ENGINEERS

We need engineers with experience in design, development or testing of mechanical and electrical equipment, preferably in the aeronautical field. We also need engineers with background in aircraft fuel system component and materials development.

Your resume giving details of education, experience, and salary requirements will be held in strict confidence.

Write today to Personnel Director

FLIGHT REFUELING, Inc.

Danbury, Conn.

ENGINEERS!

ADVANCED PROJECTS OPEN NEW CAREERS AT RYAN

- ★ Airframe Designers
- ★ Stress Analysts
- ★ Power Plant Engineers
- ★ Aerodynamicists
- ★ Electronic Engineers
- ★ Draftsmen and Loftsmen

Replies to Director of Engineering will be held in strict confidence

RYAN
AERONAUTICAL COMPANY
San Diego 12, California

Engineers, physicists, designers, technicians—

Investigate the challenging new opportunities in the guided missile industry

BENDIX OFFERS EXCELLENT POSITIONS IN ITS WELL-ESTABLISHED GUIDED MISSILE PROGRAM

To men interested in the rapidly growing guided missile industry, an association with Bendix offers unusual advantages. For here at Bendix, guided missile work is not a side line, but a well-established program with over seven years of successful development and research backing up today's operations.

No finer engineering and production facilities are found anywhere in the industry, and the men responsible for the Bendix guided missile program are recognized leaders in their field. Job opportunities range from theoretical systems analysis, through product and test equipment design and development, to field test and flight evaluation.

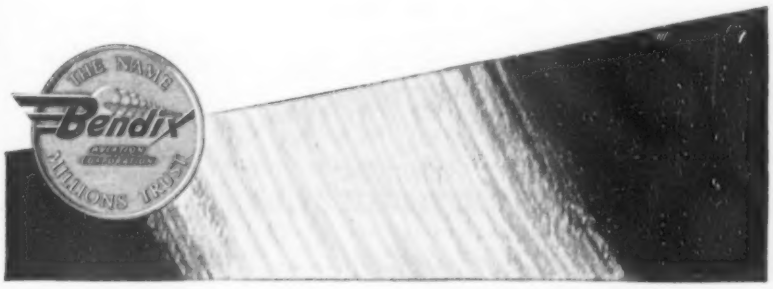
OPENINGS IN:

Aerodynamics	Hydraulics
Electronics	Mechanics
Microwaves	Servo Mechanisms
Dynamics	Structures

LET'S DISCUSS OUR MUTUAL INTERESTS

Write:

Employment Dept. Bendix Products Division
Bendix Aviation Corporation, 401 Bendix Drive
South Bend 20, Indiana



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Birmingham, Alabama

is one of the largest multi-engine aircraft modification centers in the United States. Here multi-engine aircraft are completely reconditioned and modified. In addition, Hayes is designing many prototype installations and manufacturing kits for many special Air Force projects. Hayes is a leader in the industrial expansion of the South, and is foremost in aircraft engineering.

Top-flight design positions are now open to qualified aircraft engineers for:

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- ELECTRONIC INSTALLATION DESIGN
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- TECHNICAL WRITERS and ILLUSTRATORS

Write to:
Executive Engineer
Hayes Aircraft Corporation
P. O. Box 2287
Birmingham, Alabama

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TWINS and BONANZAS
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For the best, consult your
BEECHCRAFT DISTRIBUTOR

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LOGAN AIRPORT — BOSTON, MASS.
Hasbrouck Heights 8-1740
East Boston 7-4630

FOR SALE

One brand new Sciaky 100 KVA 3 phase Spot welder PMCO-2ST-200-36. New machine guarantee. Installed in our new aircraft plant, but never used. Can be operated for inspection. Very attractive price. Immediate delivery.

THE KAWNEER CO.
1105 N. Front St.
NILES, MICHIGAN

Gadgets, Inc.
HYDRO-WYPE SCRAPER RINGS
AN-6231-A
Write for complete catalog to: ATSCO
Dept. W, 4217 North Main St., Dayton 5, Ohio

Model 049
CONSTELLATION

For sale by Owner

Formerly in BOAC Service

Overseas Interior and Radio

1655 Hrs. Since Major Overhaul and Tank Reseal By Lockheed Aircraft Service

R-3350 BA3 Fuel Injected Engines
#1 899:51 hrs. #2 825:41 hrs. #3 700:45 hrs. #4 Zero

This is a Straight Model 049, Not a Converted C-69

$865,000 or

Call, Write or Wire Best Offer—Will Accept Trade

KIRK KERKORIAN
LOS ANGELES AIR SERVICE
Municipal Airport — *Osborne 6-0411* — Hawthorne, California

For Sale
DC-4's—C-47's—Lodestars
Convair 240—Constellation
WESTAIR, Inc.
White Plains, N. Y.

FOR SALE $62,000.00
DC3/G202A, 24 volt, 21 seats, deluxe interior, low time engines, airline certificated radios, *immediate delivery*—terms.
Send All Inquiries to 1530 Donaldson, San Antonio, Texas. University 6-0692.

Rommert-Werner, Inc.
Lambert Field, St. Louis, Mo.
Executive Aircraft

DC-3 Lodestar D18S
Conversion-Maintenance-Parts
Complete Services & Sales

FOR SALE
DE HAVILAND DOVE
Executive Model DH-104

Collins Omni, Collins Transmitter, Collins Glide Path, Type 17VHF Communications, Bendix MN-31, 333 Marker Receiver, AR100D Isolation Speaker Amplifier, Iron Core Loop, Central Control Panel, Long Range Fuel Tank, TKS De-Icing, Oxygen System.

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NAVCO INC.

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TErryhill 5-1511

HAS IN STOCK

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Bendix	MN53 Marker Receivers
Collins	17L VHF 180 Ch. Trans. 17M VHF 360 Ch. Trans. 51R VHF 280 Ch. Rcvr. 51R VHF Omni, RMI 560 Flight System 51Z 3-light marker 51V UHF 20 Ch. Glide Slope 18S MHF 20 Ch. Tr.-Rcvr.
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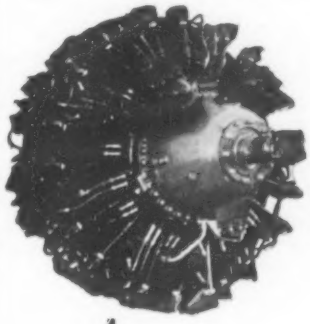

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LETTERS

More on Collisions

"Who Hit Whom" in the July 6 "Cockpit Viewpoint" indicates that Columnist Robson ought to re-title his column "Poppycock Viewpoint."

AOPA has voiced a dim view of CAB findings in cases where airliners have collided from behind with small planes. CAR 60.14 (d) is quite explicit in such cases, requiring the overtaking aircraft to "keep out of the way of the other"—even regardless of subsequent changes in their relative positions. AOPA has pointed out that there must have been a violation of this rule, and taken exception to CAB's failure so to find. Those are facts: not "poppycock" as Robson says.

On the other hand, Capt. Robson indulges in some really rare poppycock:

"There is a popular misconception that a slow airplane cannot overtake, and be at fault, in a collision with a faster one. Not so. A collision course may be established . . merely by arranging speed, distance and direction so that there is a common focal point." (Underlining mine)

But you can't meddle with their speeds, Captain. Let there be a difference in speed of 1 mph. or more. Let the headings be within 45 deg. of each other, so that an overtaking situation exists. Now, you pick the initial distances and directions, and the specific speeds, Captain, and let's see your pencil and paper diagrams and CAR rules of the road get that slower plane out ahead of the faster one. You see—he has to be there in the beginning to get hit. Try it.

But there's more: "The naked eyeball" is not enough to prevent collisions, sez he. "Several have occurred because opposing planes remained in each other's blind spots." I submit that it is possible to see anywhere ahead or to the side of any airliner if a planned watch is maintained, and the pilots move their heads sufficiently to move the cockpit obstructions around. That, as Robson himself observes, most of these collisions have occurred under better than usual visibility conditions is, I submit, proof that the naked eyeball could have avoided them if properly exercised. Trouble is that when visibility is good, we don't look around as much.

If cockpit visibility is actually so poor from airliners that they cannot comply with CAR, then they should be grounded forthwith. And if any airline pilot thinks he can excuse his failure to look out for the other guy by recourse to impossible claims on the laws of physics, he should be grounded too. And that isn't poppycock!

ALLEN W. HAYES
Chartair
Ithaca, N. Y.

Praise

I have read your excellent editorial titled, "Air Power Is Sabotaged." You certainly stated the case clearly and with telling effect, especially in calling attention to your prophetic editorial in 1950. It proved to me you have an awfully good crystal ball. . . .

RICHARD S. BOUTELLE, President
Fairchild Engine and Airplane Corp.
Hagerstown, Md.

Agents' Free Rides

Attached are a couple of ACA-110 forms, used by CAA agents. Note the instructions for handling. This is the most abused form of transportation; agents use them to go anywhere and everywhere, and at any time.

Here is how it is worked: The agent issues the four copies as per instructions, then he tears up the third copy, although usually it is not considered too much of a chance just to go ahead and turn it in, as the airline and the Administration have never gotten together to check up on where or why everybody is going.

Keep up the good work. A CAA AGENT

Form ACA-110 (1-50)

DEPARTMENT OF COMMERCE
CIVIL AERONAUTICS ADMINISTRATION

AGENT'S REQUEST FOR ACCESS TO AIRCRAFT

TO (NAME OF AIR CARRIER)

FOR ACCESS TO AIRCRAFT DEPARTING

TIME | DATE

FROM

TO

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When a request is issued on a *"must ride"* basis, an explanation of the necessity therefor must be briefly but clearly stated on the reverse of the third and fourth carbon copies.

AVIATION CALENDAR

Sept. 21-25—Eighth National Instrument Exhibit, Instrument Society of America, Sherman Hotel, Chicago.

Sept. 22-25—1953 meeting of Aircraft Spark Plug and Ignition Conference, Champion Spark Plug Co., Toledo.

Sept. 26—American Rocket Society, meeting of the New York section, U. S. Naval Air Rocket Test Station, near Dover, N. J.

Sept. 28-30—Ninth annual meeting, National Electronics Conference, Hotel Sherman, Chicago.

Sept. 29-Oct. 1—American Institute of Electrical Engineers, middle eastern district meeting, Daniel Boone Hotel, Charleston, W. Va.

Sept. 29-Oct. 3—SAE National Aeronautics Meeting, Aircraft Engineering Display and Aircraft Production Forum, Hotel Statler, Los Angeles.

Sept. 30-Oct. 2—Aircraft electric equipment conference, American Institute of Electrical Engineers, Benjamin Franklin Hotel, Seattle.

Sept. 30-Oct. 2—Series of seminars on transonic testing in windtunnels, Purdue University, Lafayette, Ind.

Oct. 1-3—Air Reserve Assn.'s annual convention, Angebilt Hotel, Orlando, Fla.

Oct. 5-9—General meeting of the International Air Transport Assn., Montreal.

Oct. 9-23—National Safety Congress and Exposition, Chicago. Aeronautical industries section will be held at the Hamilton Hotel, air transport at the Conrad Hilton.

Oct. 10—England-Christchurch (New Zealand) air race.

Oct. 13-15—Air Transport Assn.'s annual Engineering and Maintenance Conference, Saxony Hotel, Miami Beach, Fla.

Oct. 14-15—Annual airport development and operation conference, sponsored by New York Dept. of Commerce, Onondaga Hotel, Syracuse, N. Y.

Oct. 15-16—Aircraft Electrical Society, 10th annual display meeting, Pan-Pacific Auditorium, Los Angeles.

Oct. 21-23—National Metal Congress, City Auditorium, Cleveland.

Oct. 22-23—Radio Technical Commission for Aeronautics, 1953 fall assembly, Sheraton Park Hotel, Washington, D. C.

Oct. 23—National Advisory Committee for Aeronautics annual meeting, Illinois University Institute of Technology, Champaign, Ill.

Oct. 23-24—Fourth annual National Noise Abatement Symposium, Armour Research Foundation of Illinois Institute of Technology, Chicago. Airplane and airport noise will be discussed by NACA's H. H. Hubbard.

Nov. 3-4—1953 Transport Aircraft Hydraulics Conference, sponsored by Vickers, Inc., Hotel Park Shelton, Detroit.

Nov. 4-6—Society of Automotive Engineers, meeting of committee on aircraft hydraulic and pneumatic equipment, Statler Hotel, Washington, D. C.

Nov. 19-21—National Aviation Trades Assn., 14th annual convention, Hotel Broadview, Wichita.

Dec. 17—Seventeenth Wright Brothers Lecture, U. S. Chamber of Commerce building, Washington, D. C.

ADVERTISERS IN THIS ISSUE

AVIATION WEEK—SEPTEMBER 21, 1953

AERO DESIGN & ENGINEERING CO. 23
Agency—Tom P. Gordon Co.

AEROTEC CORPORATION, THE 80
Agency—Hening & Co., Inc.

AIRBORNE ACCESSORIES CORP. 8
Agency—Gray & Rogers Adv.

AIRCRAFT EQUIPMENT TESTING CO. 30
Agency—Mahool Advertising, Inc.

ALLIED INDUSTRIES, INC. 41

ALLISON DIV., G.M.C. ..... Fourth Cover
Agency—Kudner Agency, Inc.

AMERICAN AIRLINES, INC. 68, 69
Agency—Ruthrauff & Ryan, Inc.

AMERICAN CHAIN & CABLE, PAGE STEEL & WIRE DIV. 38
Agency—Reincke, Meyer & Finn, Inc.

AMERICAN PHENOLIC CORP. 84
Agency—Burton Browne Adv.

BEECH AIRCRAFT CORP. 6
Agency—Erwin, Wasey & Co., Inc.

CANNON ELECTRIC COMPANY 66
Agency—Hixson & Jorgensen, Inc.

CITIES SERVICE OIL CO. 29
Agency—Ellington & Co., Inc.

COLLINS RADIO CO. 67
Agency—W. D. Lyon Co., Inc.

DARNELL CORP., LTD. 21
Agency—Henry L. Rhea Adv.

DOUGLAS AIRCRAFT CO. 86
Agency—J. Walter Thompson Co.

DOW CHEMICAL CO. 54
Agency—MacManus, John & Adams, Inc.

DOW CORNING CORP. 73
Agency—Don Wagnitz Adv.

EBERHARD FABER PENCIL CO. 45
Agency—Hicks & Greist, Inc.

ECLIPSE-PIONEER DIV. BENDIX AVIATION CORP. 58
Agency—MacManus, John & Adams, Inc.

ELECTRICAL ENGINEERING & MFG. CORP. 19
Agency—West Marquis, Inc.

FLYING TIGER LINE, INC. 40
Agency—Hixson & Jorgensen Adv., Inc.

GENERAL ELECTRIC CO. 60, 61
Agency—G. M. Basford Co.

GOODRICH CO., B. F. 3
Agency—Batten, Barton, Durstine & Osborn, Inc.

GULF OIL CORP. 59
Agency—Young & Rubicam, Inc.

HARTWELL AVIATION SUPPLY CO. 49
Agency—The McCarty Company

HARVEY MACHINE CO. ..... Third Cover
Agency—Hixson & Jorgensen, Inc.

HI-SHEAR RIVET TOOL CO. 37

HYDRO AIRE, INC. ..... Second Cover
Agency—Roy S. Durstine

LAND-AIR, INC. 56
Agency—Symonds, MacKenzie & Co., Inc.

LEAR, INC. 87
Agency—Buchanan & Co., Inc.

MARTIN CO., THE GLENN L. 32
Agency—Vansant, Dugdale & Co., Inc.

MAXSON CORP., THE W. L. 41
Agency—Engineered Advertising

MELETRON CORPORATION 26
Agency—Welsh Hollander Adv.

MICRO SWITCH 78, 79
Agency—Reincke, Meyer & Finn, Inc.

MINNEAPOLIS HONEYWELL REGULATOR CO. ..... Front Cover
Agency—Foote, Cone & Belding

MISCO PRECISION CASTING CO. 34
Agency—L. Charles Lussier, Inc.

NORTH AMERICAN AVIATION, INC. 71
Agency—Batten, Barton, Durstine & Osborn, Inc.

OHIO SEAMLESS TUBE CO. 35
Agency—Howard Swink Adv. Agency

OSTER MFG. CO., JOHN 75
Agency—Klau-Van Pieterson-Dunlap Assoc., Inc.

PACIFIC DIVISION—BENDIX AVIATION CORP. 77
Agency—The Shaw Company

PACKARD ELECTRIC DIV., G.M.C. 72
Agency—Campbell-Ewald Co.

PASTUSHIN INDUSTRIES, INC. 8
Agency—Lynn-Western, Inc.

PERMACEL TAPE CORP. 25
Agency—The Aitkin-Kynett Co.

PESCO PRODUCTS CO. 81
Agency—Fuller & Smith & Ross, Inc.

PIONEER PARACHUTE CO. 10
Agency—Julian Gross Advertising Agency

PRATT WHITNEY AIRCRAFT DIV., UNITED AIRCRAFT CORP. 31
Agency—Lennen & Newell, Inc.

RED BANK DIV., BENDIX AVIATION CORP. 33
Agency—MacManus, John & Adams, Inc.

REF MANUFACTURING CORP. 36
Agency—H. L. Mihlie & Co., Inc.

REPUBLIC STEEL CORP. 74
Agency—Meldrum & Fewsmith, Inc.

ROEBLING'S SONS CO., JOHN A. 4
Agency—Beatty & Oliver, Inc.

ROHM & HAAS CO. 43
Agency—John Falkner Arndt & Co., Inc.

RYERSON & SON, INC. 65
Agency—Aubrey, Finlay, Morley & Hodgson, Inc.

SCINTILLA MAGNETO DIV., BENDIX AVIATION CORP. 24
Agency—MacManus, John & Adams, Inc.

SCOTT AVIATION CORP. 36
Agency—Melvin F. Hall Adv., Agency

SEARCHLIGHT SECTION 93, 94, 95, 96, 97, 98, 99, 101

SENSENICH CORP. 71
Agency—Foltz Wessinger, Inc.

SERVICE STEEL DIV.—VAN PELT CORP. 70
Agency—Claude E. Whipple Adv.

SHELL OIL CO. 5
Agency—J. Walter Thompson Co.

SINCLAIR REFINING CO. 82, 83
Agency—Morey, Humm & Johnstone, Inc.

SOUTH GATE ALUMINUM & MAGNESIUM CO. 44
Agency—Byron H. Brown & Staff

STILLMAN RUBBER CO. 30
Agency—Lynn-Western, Inc.

SUMMERS GYROSCOPE CO. 50
Agency—Byron H. Brown & Staff

SWEENEY ENGINEERING CORP. 76
Agency—Advertising Engineers Corp.

TAYLOR-WINFIELD CORP. 28
Agency—Meek & Thomas, Inc.

TEXAS INSTRUMENTS, INC. 22
Agency—Laughlin-Wilson Baxter & Persons Adv.

THOMPSON AIRCRAFT TIRE CORP. 39
Agency—Norton M. Jacobs Adv. Agency

TINNERMAN PRODUCTS, INC. 78
Agency—Meldrum & Fewsmith, Inc.

TWIN COACH CO. 27
Agency—Palm & Patterson, Inc.

UNIVERSAL METAL PRODUCTS 55
Agency—Byron H. Brown & Staff

VAN DUSEN AIRCRAFT SUPPLIES 63
Agency—Davis-Parsons, Inc.

VERSON ALL STEEL PRESS CO. 51
Agency—Russell T. Gray, Inc.

WESTERN GEAR WORKS 64
Agency—Ruthrauff & Ryan, Inc.

WESTINGHOUSE ELECTRIC CORP. 46, 47
Agency—Fuller & Smith & Ross, Inc.

WESTINGHOUSE ELECTRIC CORP. 85
Agency—H. W. Buddemeir Co.

WESTON HYDRAULICS LIMITED 52, 53
Agency—Anderson-McConnell Adv. Agency

WITTEK MFG. CO. 71
Agency—Merrill & McEntee & Assoc., Inc.

SEARCHLIGHT SECTION

(Classified Advertising)

H. E. Hiltz, Mgr.

EMPLOYMENT
Positions Vacant 93-99
Selling Opportunities Offered 96
Positions Wanted 96
Selling Opportunity Wanted 96
Employment Agency 96

EDUCATIONAL
Books 96

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EDITORIAL

Airlines Look to the Helicopter

The Korean truce, bringing the possibility that commercial transport helicopters may be available sooner than expected, is spurring the air transport industry's study of copters.

As AVIATION WEEK reported Aug. 24, the Air Transport Assn.'s committee on helicopters already has submitted its preliminary report to the board of directors. Now the committee is being expanded, and the study will move ahead.

Among the early conclusions in this significant appraisal by scheduled air transport executives is the conviction that "the helicopter will enable the airlines, for the first time, to compete effectively time-wise with all forms of surface transportation in the huge shorthaul intercity market."

Also important is the committee's belief that total operating costs of projected transport helicopters can approach those of present twin-engine aircraft although profitable operation may require higher load factors or higher fares.

The report says limited fleet operations of multi-engine transport helicopters of 30 to 50 passengers capacity can be achieved by 1959-60.

"Before transport helicopters can be successfully integrated into scheduled airline operation, a system of heliports and communications and navigational aids peculiar to helicopters must be developed," the committee emphasizes. Charles Froesch, vice president-engineering for Eastern Air Lines, one of the industry's top technical executives, has served as committee chairman.

The airlines are mainly interested in intercity operation of helicopters, rather than using them as taxis or in suburban services.

One member of the committee informs us that the group believes helicopters will succeed such transports as the Convair and Martin 4-O-4, at least in many types of routes these craft now are flying.

"Many cities located on trunklines today deserve air service but cannot afford fixed-wing airport installations," it is pointed out. The helicopter would thus bring direct air service to scores of new communities.

In light of frequent complaints about "low" speeds of rotorcraft, it is significant to read that the ATA experts say cruising speeds of helicopters need not be considerably faster than they are now. "The elapsed time from city-center to city-center using the helicopter is better than the elapsed time using any combination of surface vehicles to and from the airports and fixed-wing aircraft between airports at all stage distances up to 200-250 miles," the veteran airline observers believe.

However, the increasing popularity and construction of super-highways to utilize the greater speed of the automobile "may seriously affect our present local schedule traffic volume."

The helicopter, the committee has decided, can be integrated in the air transport industry's local schedule requirements within the next decade, at an overall cost no greater than present-day twin-engine aircraft, and at fares no higher than first-class air tariffs prevailing today, adjusted to include present ground transportation costs, so that the average fare to the passenger per mile will be no greater.

"A precise delineation of payload size will be governed by the availability of powerplants. . . . Fortunately, the Pratt & Whitney R2800 engine seems about right for a 30- to 40-passenger helicopter. Later, 50-passenger versions equipped with turbine engines or similar powerplants may be possible. Substitutions of turbine power for reciprocating engines will depend on the rate of progress made with the development of shaft turbine engines."

The committee believes that a "mature helicopter service" could divert 55% of the first-class shorthaul railroad traffic, and 5% of the existing rail coach market.

High-density population is deemed a prerequisite for successful helicopter operations, with short distance between cities as a secondary criterion.

The committee says a level of safety anything less than that attained by scheduled airlines cannot be tolerated.

The ATA deserves credit for initiating a thoroughgoing and continuing survey of the potentialities of the revolutionary helicopter and other rotor craft.

—Robert H. Wood

Curtis W. McGraw

Aviation lost a strong friend with the death Sept. 10 of Curtis W. McGraw, president and chairman of the board of the McGraw-Hill Publishing Co. in New York. He was 57.

Mr. McGraw, whose home was in Princeton, N. J., was the third son of the late James H. McGraw, Sr., founder of the publishing company, and of Mrs. Mildred Whittlesey McGraw, who survives him. His wife, the former Elizabeth Woodwell; a daughter, Mrs. James L. Stoltzfus, and three brothers, Harold W. McGraw, James H. McGraw, Jr., and Donald C. McGraw, also survive.

Mr. McGraw was a graduate of Princeton University. He was a major of infantry in World War I and saw foreign service. He was active in civic affairs, and was a member of the Postmaster General's recently appointed advisory board of the Post Office Dept. He was a past director and past president of the American Book Publishers Council. He was a director of numerous boards in banking, charities, cultural institutions and sport groups.

He joined McGraw-Hill in 1920, and served as vice president, treasurer and director of McGraw-Hill Book Co., a subsidiary, from 1927 to 1950. He became vice president and treasurer of McGraw-Hill Publishing Co., in 1943, and in February 1950 was elected president and chairman of the board.

The enduring mark of his leadership in the task of keeping business well-informed, shaping the technical development of industry and holding the nation to an awareness of its power for greatness and goodwill remain on the pages of all McGraw-Hill publications.

Being ready for tomorrow means taking a step into the future today. A good example is this extra wide integrally stiffened skin section being produced by Harvey today, bringing into play new extrusion tooling design coupled with larger extrusion equipment. While keeping our eyes ever open to uses of the future, men and machines at the Harvey plant are presently concerned with making the most of aluminum for today's industry. We at Harvey have built our reputation on the special interest we take in special problems, of which the aircraft manufacturer has more than his share. Remember, a Harvey Field Engineer is as near as your telephone.

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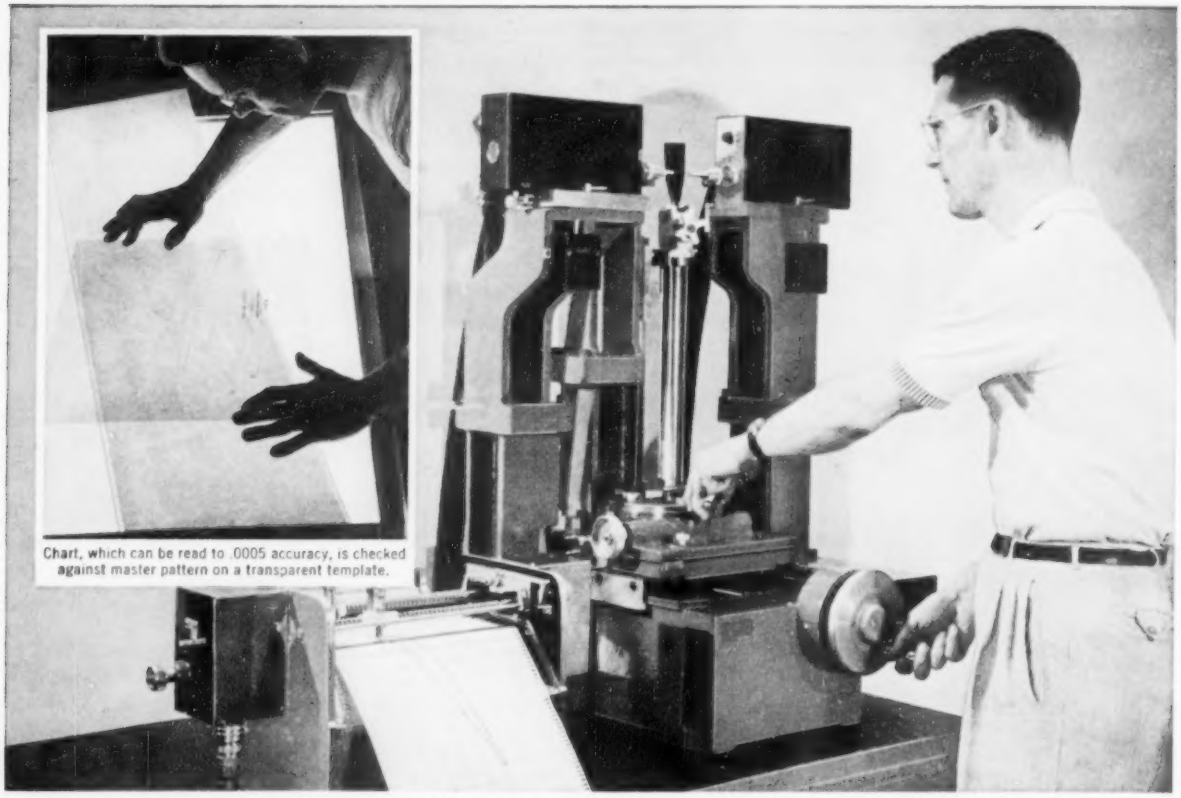

Chart, which can be read to .0005 accuracy, is checked against master pattern on a transparent template.

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Here is another example of Allison and General Motors engineering ingenuity that pays off in more dependable jet performance and lower cost manufacture—typical of the continuous pioneering which maintains leadership for Allison engines in the air.

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